

ESTABLISHING AIR COMPONENT STARTING CONDITIONS
FOR ARMY EXERCISES

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ABSTRACT

ESTABLISHING AIR COMPONENT STARTING CONDITIONS FOR ARMY EXERCISES, by MAJ Anthony W. Rush, 125 pages.

Lessons learned from Operation Iraqi Freedom and doctrinal changes highlight a need for the Army to modify scenario development by changing how the Army integrates air component play into exercises. Thus, the central question is: What process can scenario developers utilize to replicate the planning, employment and application of airpower in order to establish intelligence, surveillance and reconnaissance and targeting starting conditions for training Corps and Division staffs? Examining joint and air component doctrine yielded a process which would define the operational environment and incorporate air operation planning and execution. These steps account for the planning, executing, and assessing air operations with respect to targeting, collection management, and operational assessment based on joint, not Army, doctrine. This resulted in a list of required products that exercise directors should provide the training unit prior to the exercise. Early involvement of the training unit in the scenario planning process facilitates better understanding of joint targeting and collection management processes.

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ACRONYMS

ACO	airspace control order
ACM	airspace control measure
AI	air interdiction
AOC	Air Operations Center
ASOC	Air Support Operations Center
ATO	air tasking order
BCD	battlefield coordination detachment
BCTP	Battle Command Training Program
BDA	battle damage assessment
C2	command and control
CA	combat assessment
CAS	close air support
CALL	Center for Army Lessons Learned
CCDR	combatant commander
CENTAF	Central Air Forces
CFACC	Combined Force Air Component Commander
CJTF	Commander, Joint Task Force
DMPI	desired mean point of impact
DP	decisive point
EASOG	Expeditionary Air Support Operations Group
EBO	effects-based operations
FSCM	fire support control measure
HVT	high value target

IPB	intelligence preparation of the battlespace
ISR	intelligence, surveillance and reconnaissance
JAOP	joint air operations plan
JCMB	Joint Collection Management Board
JFACC	Joint Force Air Component Commander
JFC	joint force commander
JFCOM	Joint Forces Command
JFLCC	Joint Force Land Component Commander
JFMCC	Joint Force Maritime Component Commander
JGAT	Joint Guidance, Apportionment, and Targeting
JIPB	joint intelligence preparation of the battlespace
JIPTL	Joint Integrated Priority Target List
JOPP	Joint Operation Planning Process
JTCB	Joint Targeting Coordination Board
JTF	Joint Task Force
JTTI	joint training transformation initiative
JSOTF	Joint Special Operations Task Force
MAAP	Master Air Attack Plan
MEA	munitions effectiveness assessment
MEB	marine expeditionary brigade
OE	operational environment
OEF	Operation Enduring Freedom
OIF	Operation Iraqi Freedom
OPFOR	opposing force
PMESII	political, military, economic, social, infrastructure, information

RTW	Road to War
STARTEX	exercise starting conditions
TNL	target nomination list
TRADOC	US Army Training and Doctrine Command
UEx	unit of employment x

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CHAPTER 1

INTRODUCTION

Problems with Army Exercises

Following the overwhelming success of major combat operations during Operation Iraqi Freedom (OIF), a key Air Force organization offered a training recommendation to better help the Army understand how air and space power is planned and employed. The 4th Expeditionary Air Support Operations Group (EASOG), supporting V Corps (US) during OIF, recommended that “USA warfighting exercises need to fully integrate realistic Combined Force Air Component Commander (CFACC) play” (4th EASOG 2003, 23). Training staffs in accordance with this recommendation requires the portrayal of the command and control structure, doctrine and capabilities to properly reflect the employment and contributions of the Joint Force Air Component Commander (JFACC).

Normally serving as the JFACC, the Air Force provides the bulk of the air and space support to the Army. Army scenario developers, while balancing training objectives with portraying a realistic, credible joint fight, must determine a logical starting point to begin the exercise. For a typical Army exercise, this starting point is the initiation of ground combat with the Joint Force Land Component Commander (JFLCC) as the supported commander with the JFACC in support for counterland operations. To place the campaign into context for the participating staff, scenario developers must account for all of the actions that have occurred prior to the start of the exercise. This accounting is often termed “Road to War” (RTW).

An outcome of the RTW is the definition of starting conditions which define the operational environment (OE) in terms of friendly and enemy strengths, locations, dispositions, and other characteristics. With respect to the RTW, intelligence, surveillance, reconnaissance (ISR), and targeting are important because they demonstrate the application of doctrine and the capabilities of the joint force. The Joint Force Commander (JFC), employing his components, can shape the JFLCC's fight. If reflected in the RTW, scenario developers can teach participating staffs about joint capabilities, doctrine and limitations while reinforcing the importance of fighting as a joint force, even though this may not be the primary training objective. The degree to which the exercise reflects capabilities and doctrine to create starting conditions only serves to inject realism into the simulation and make the scenario more credible to the training audience.

Given the unique relationship between the Army and Air Force, the key question is, What process can scenario developers utilize to replicate the planning, employment and application of airpower in order to establish intelligence, surveillance and reconnaissance and targeting starting conditions for training corps and division staffs? To develop an answer to this key question, this thesis will examine the following: (1) How does the application of current and emerging joint doctrine affect corps and divisions with respect to ISR and targeting? (2) How can Army scenario developers incorporate JFACC doctrine into Army scenario development? (3) What ISR and targeting starting conditions are required to begin an Army exercise and (4) How should Army scenario developers simulate the effects of airpower to establish credible ISR and targeting starting conditions? To better understand the problem, a review of current and emerging joint doctrine and its relation to this problem is in order.

Background

Since the 1990s, the Air Force has developed an effects-based approach to operations. Air planners during the Gulf War, trying to maximize the use of scarce resources, thought in terms of desired functional effects on the enemy system under attack (Gorman 2006, 310-11). These effects went beyond attrition of enemy systems. This effects-based operational approach measured success in terms of “effective control” over enemy actions rather than by their physical destruction (Gorman 2006, 311). The objectives and effects accomplished were more important than destruction of a set number of enemy targets. This operational approach, further developed at Joint Forces Command (JFCOM) who is the joint proponent for doctrine, is now a part of emerging joint doctrine. This effects-based approach to operations appears in the 2006 rewrite of Joint Publication 5-0, *Joint Operation Planning*. The implication is clear: effects-based operations (EBO) will be a part of joint doctrine.

JFCOM describes what EBO are:

An effects-based approach to joint operations calls for thinking differently about how best to employ national instruments of power. The JFCs seek a broader and deeper understanding of the OE [operational environment]: a systems perspective of the operational area (OA). This understanding and thinking includes how to use the military instrument beyond just force on-force campaigns, battles and engagements. (Joint Warfighting Center (JWC) 2006, viii)

A major difference from previous planning constructs to this one is the use of the term, “systems perspective.” JFCOM defines a system as, “A functionally, physically, or behaviorally related group of regularly interacting or interdependent elements; that group of elements forming a unified whole. Systems associated with national security include political, military, economic, social, infrastructure, information, and others (PMESII)” (Joint Warfighting Center 2006, I-3). Finally, JFCOM defines an effect as, “The physical

and/or behavioral state of a system that results from an action, a set of actions, or another effect” (Joint Warfighting Center 2006, I-3). Thus, EBO defines the operational environment as a series of related systems and how the application of the instruments of national power might create changes in these systems with predictable results.

Once the staff defines the OE, they translate the OE into centers of gravity (COG) and decisive points (DP). The COG analysis in EBO remains essential to operational design, mission analysis and COA determination (JWC 2006, II-9). The essence of operational art and design is a focused operation against an enemy's COGs while protecting one's own (JWC 2006, II-10). While EBO may alter how planners define the OE, its incorporation of COG analysis fits neatly into accepted military theory. If planners define the OE into COGs and DPs, then the use of EBO illuminates which COGs and DPs are the most critical to an enemy system and merit influence or attack.

An analysis of which DPs to attack is critical to the success of attacking a center of gravity. Normally, there will be more DPs in an operational area than the commander can control, destroy, or neutralize with available resources (JP 3-60 2002, II-1). This causes the staff to recommend to the commander which among these DPs is the most important to target. The commander designates the most important DPs as objectives and allocates resources to control, destroy, or neutralize them (JP 3-60 2002, II-1). EBO, when used to support targeting, helps the joint force commander optimize the use of scarce resources, such as the JFACC, while achieving desired effects against the enemy.

The Army does not share the same view of EBO as the Air Force. One reason is that the Army contends that EBO is only appropriate at the strategic and operational levels of war and for use by a properly resourced joint staff (FMI 5-0.1 2006, 1-10).

Given that the majority of Army operations occurs at the tactical level of war, using EBO would be improperly applying an operational- or strategic-level tool. This does not pose the same problem for the Air Force since its operations can and frequently span from the tactical in the case of close air support (CAS) to the strategic in the case of strategic attack. Thus, EBO would have more applicability to those services that create effects at the operational or strategic level of war.

Army doctrine writers also argue that EBO does not fundamentally change Army doctrine since the Army's fundamentals of full spectrum operations and mission command include the idea of focusing all efforts toward achieving the operation's endstate (FMI 5-0.1 2006, 1-11). The means by which the Army does this is through the results of executing a task or combinations of tasks for a specific purpose (FMI 5-0.1 2006, 1-11). If the execution of those tasks occurs at the tactical level, then the accumulation of tactical effects which influences operational and strategic COGs is what leads to the desired operational and strategic endstate. This differs from airpower theorists who have advocated striking COGs directly in order to shorten wars and contain conflict.

Air theorists from Douhet to Warden have long argued that airpower can achieve decisive results by attacking directly against strategic COGs. This is known as strategic attack in Air Force doctrine. The Air Force argues that since strategic attack represents the highest potential payoff, commanders should avoid the temptation to divert resources from it to service the operational- or tactical-level fight (AFDD 2-1.2 2003, 39). This dilemma, determining the amount of effort to expend at the strategic level vice operational or tactical levels, is one of the challenges that face the air strategist and the

JFC. If more weight is given to strategic efforts, then the Army may face more fielded forces once combat commences. If the opposite is done, then the Army may benefit at the expense of strategic effects. The way in which the JFC prioritizes these competing efforts will impact Army operations.

The Army acknowledges this dilemma by cautioning that while EBO is not the doctrinal basis by which staffs plan Army operations, Army headquarters must understand how joint forces use effects during joint operations (FMI 5-0.1 2006, 1-7). Since Army divisions and corps routinely serve as the base for joint task forces or components of a joint task force, this understanding is vital. Without it, Army headquarters would not understand or agree with how joint planners arrive at their conclusions about the nature of the operation since each (joint and Army) uses a different doctrinal construct as their basis for analysis.

While the Army may disagree with the joint community about the theoretical applicability of EBO, the Army does recognize the importance of unified action in operations involving joint forces and interagency partners. Joint Publication 0-2 defines unified action as,

A broad generic term referring to the **wide scope of activities** (including the synchronization and/or integration of the activities of governmental and nongovernmental agencies) taking place within **unified commands, subordinate unified commands, or joint task forces (JTFs)** under the overall direction of the commanders of those commands. (JP 0-2 2001, I-5)

Unified action, under this definition, seeks to establish unity of command and effort within the operational area. This differs from past operations where, “operations were broadly classified as continental, maritime, aerospace or unconventional” (Modularity

2004, vii). The joint community terms this complementary and reinforcing relationship joint interdependence.

Army doctrine describes joint interdependence as,

[T]he complementary use of Army forces with those of other Services as part of the joint force. It is the purposeful reliance on other Service capabilities to maximize their total complementary and reinforcing effects while minimizing their relative vulnerabilities. Joint interdependence reinforces and complements the effects of Army combined arms operations. It makes Army forces more effective than they would be otherwise. (FMI 5-0.1 2006, 1-2)

Furthermore, FMI 5-0.1 states that these interdependencies are, “intelligence, surveillance, and reconnaissance (ISR); maneuver; fires; protection; sustainment; and command and control (C2)” (2006, 1-2). While not inclusive, this list is important as the Army formally acknowledges a dependence on other services and components for certain warfighting functions, even though the Army may possess these capabilities.

This relationship between the air and ground components is why the replication of the JFACC in Army exercises is crucial. Without some realistic representation of airpower, Army staffs would not have the benefit of sorting through a myriad of issues that arise when operating as part of a joint operation, particularly when the JFACC is conducting counterland operations in support of the JFLCC. Issues such as supported-supporting relationships, apportionment, distribution of airpower, appropriate employment of JFACC assets, and targeting would never stress the Army staff. Having to address these issues creates better Army staffs more capable of integrating into and operating as part of a joint task force. This thesis will examine how this relationship impacts the construction of training scenarios and the assumptions which govern the establishment of initial starting conditions for a given exercise. If an Army training scenario, using Army forces operating as part of a joint task force, uses airpower to shape

the OE for future land component operations, then an understanding of JFACC planning will facilitate the proper employment of JFACC capabilities upon which the Army is interdependent.

JFACC planning is conducted in two parts. The first part, the joint air operations planning process, is a five-step process which begins with operational environment research and ends with the production of the joint air operations plan (JAOP) (AFDD 2-1 2000, 39). The second part of the joint air operations planning process is the production and execution of the air tasking order (ATO) through the air tasking cycle (AFDD 2-1 2000, 49). These two processes guide the application of airpower in a theater of operations and affect how airpower is employed to support the joint force commander's (JFC's) objectives. The ATO, a document that is published daily, informs corps and division what allocation they can expect over a twenty-four hour period. The ATO development cycle occurs in five stages portrayed in figure 1.

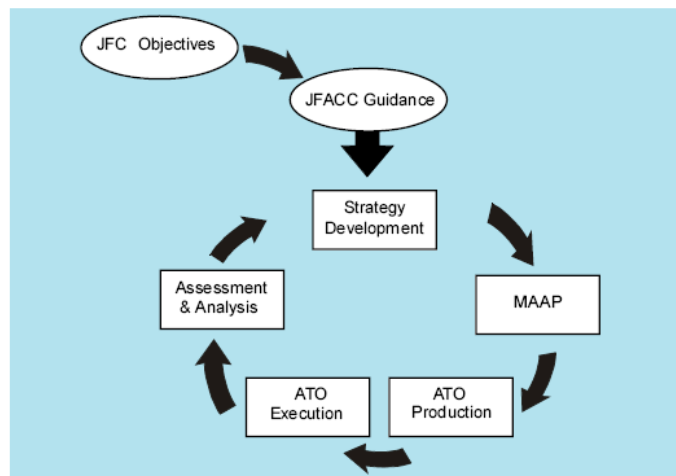


Figure 1. Nominal ATO Development Cycle

Source: Department of the Air Force, *Air Warfare* (Washington, DC: USAF, 22 January 2000).

The JFACC will formulate planning guidance for the staff. Once the staff has completed this analysis, the staff must determine how to allocate assets to achieve the JFC's objectives. This is known as the master air attack plan (MAAP). The MAAP "provides theater level sequencing and resource inputs necessary for producing an ATO and is the first time in the air tasking process that detailed resource availability is matched against specific targets" (AFDD 2-1 2000, 51). Once approved, the MAAP forms the basis for the ATO.

The final three steps, ATO production, execution, and assessment and analysis, end the loop and allow the JFACC to assess how well or poorly airpower is accomplishing the JFC's objectives. It is during these final three steps where the Army typically interfaces with JFACC assets, usually as the recipient of a close air support (CAS) or air interdiction (AI) sortie. These two functions help shape the battlefield in support of ground combat. Combined with ISR and C2 support, these effects can be quantified and translated for use in training scenarios as part of corps and division-level training exercises. If applied to account for operations that occurred prior to the start of the exercise, these effects become starting conditions.

While there is no doctrinal definition for starting conditions, the definition used by the Battle Command Training Program (BCTP) may suffice. It defines exercise starting conditions (STARTEX) as "the start of the competitive simulation" (*Exercise Director's Guide* 2005, 16). This would include defining all attributes of friendly and enemy forces required to conduct the exercise. Some of these attributes would be: strength, location, disposition, and maintenance status.

Starting conditions are important because they help shape the conduct of the exercise by creating advantageous and disadvantageous situations that commanders and staffs must address. The STARTEX can arrive through a variety of methodologies. Regardless of the methodology, the end result should be the same: “an Operational Environment (OE) that achieves desired unit training objectives while fielding a challenging opposing force (OPFOR) consistent with Contemporary Operating Environment doctrine as described in the FM 7-100 series of manuals” (Opposing Force 2004, iv). The challenge is crafting the scenario campaign plan in such a way to ensure realism, credibility and accuracy.

If the exercise is to begin in Phase III, then the exercise director should provide a Road to War to account for all of the actions that occurred from the start of Phase I to Phase III. This provides the training audience with context and assumptions about the conduct of the campaign. This is the Road to War. If used, it provides a way to help teach joint capabilities and limitations and engenders an understanding of how the joint force commander shaped the battlefield for the land component commander.

If the exercise director is to generate a set of starting conditions for the training audience, then he has several options. One option is to construct the joint course of action in the simulation and then advance the simulation until the day which denotes the start of the exercise (Tanner 2006). This would allow the exercise director to replay the simulation and use it as a teaching tool to the command and staff. Additionally, it would allow the simulation team to use of the results of the joint phases to feed directly into the Army phase of the exercise without making a lot of changes to the simulation.

A second option would be to conduct an adjudication of the results through conferences with subject matter experts. This would allow these experts to offer their advice on what credible results would be realistic based on the envisioned course of action. Once approved, the director gives the results to the simulation team to input into the simulation with the adjudicated results. When the staff arrives to conduct the exercise, they see the view of the battlefield without the benefit of a playback to show them what happened in the previous phases.

A third option would involve the staff participating in the joint phases of the operation at an accelerated pace and then slowed to real time when the Army portion of the exercise begins. This would provide the most continuity from the start of the campaign and would facilitate a better understanding of the impact of the joint fight. This would require a larger training audience as the JTF headquarters and components would need to participate.

There are numerous drawbacks to each approach. In the first case, the simulation team may not be resourced with time and manpower to simulate the joint phases of the operation as the simulation team may be the only resource available for multiple exercises (i.e., National Simulation Center). The second option may be impractical because it is impossible to gather all of the subject matter experts together at the same time. If all of the key players are not represented, then the credibility of the results may be called into question. The final approach may be desired, but infeasible because of the length of time and manpower required to conduct it. A typical warfighter exercise (not including the seminars) involves the entire focus of the staff and commanders for two to three weeks. To train both the joint and Army phases of the exercise may require more

time to conduct or dilute the focus of exercise, placing the accomplishment of the training objectives at risk. This would render the third option unacceptable.

This thesis will propose a solution that facilitates a compromise to all three options. Given the finite time available to train the staff, the training objectives to accomplish, the focus on the Army portions of the exercise (land combat), and the resources allocated to enable training (simulation teams, manpower, bandwidth, money, time, etc.), there should be an analytical tool that has the ability to quickly arrive at credible results, while adhering to doctrine and capabilities without tying up a large amount of resources in the process. The degree to which this solution models capabilities and doctrine to create starting conditions only serves to inject realism into the simulation, at a vastly cheaper cost in terms of time and effort. Ultimately, this tool should be able to replicate results of previous campaigns, such as OIF, Allied Force, and others to validate the model.

Limitations

Given the complexity, breadth and depth of joint operations, there could be literally hundred of variables requiring definition to conduct an exercise. Another challenge is deciding when in the campaign to begin the exercise. The combination of these two problems presents the chief challenge to the exercise director in any training situation. The answer to this requires limiting the scope of the problem by defining the type of operation studied, the duration of study, and which processes to study.

This thesis will examine a high-intensity conflict campaign conducted by a joint task force consisting of a JFACC, JFLCC, JFMCC and JSOTF. This joint task force's objective is the defense of a friendly nation's sovereignty. To accomplish this, the JTF

will have to defeat an invading conventional force while simultaneously disrupting an irregular threat from within the friendly nation's borders. The scenario chosen will be the Caspian Guard scenario used by the Command and General Staff College. All component references in this thesis will refer to the joint force components as opposed to their combined equivalents that exist operationally (i.e. JFACC vs. CFACC).

For the purposes of study, this thesis will assume that exercise will begin when the JFLCC, formed by a corps headquarters with a subordinate Marine Expeditionary Brigade (MEB) and Army division, becomes the supported component in Phase III (Dominate). Thus, the study period for establishing starting conditions will encompass phases 0 through II. These phases are when the other components are the supported components.

Finally, the processes meriting study in this thesis center on ISR and targeting. These processes were chosen due to the significant contribution these two processes make to ground combat. They are also two of the more interrelated processes between the JFACC and JFLCC. Without knowledge of the enemy and the means to target him, the JFLCC's fight would be more difficult.

Significance of the Study

The importance of joint interdependence cannot be overstated. In fiscally constrained times, all services have been forced to prioritize what capabilities are needed and those which other services can perform better. Some of these are also driven by the Goldwater-Nichols Act. Whatever the reason, it is clear that the Army will not possess all of the capabilities required to conduct operations; it must rely on other services to be successful. This reliance and interdependence works only when Army staffs can leverage

joint capabilities by understanding how those services plan and execute operations. Thus, staff-level exercises serve an important educational and training opportunity to teach staffs how to integrate and leverage capabilities, such as airpower and space power.

Like many aspects of doctrine, the use of airpower has undergone changes since Operation Enduring Freedom (OEF). Air and ground combat concepts are changing based on successes, failures, and the application of lessons learned. These changes demand that trainers and exercise directors revisit previous methodologies to ensure that those methods of analysis and design still apply to new concepts. While new doctrinal concepts may not invalidate exercise design methodologies, neither should those methodologies remain static in the face of changing doctrine. Modifying procedures used to design scenarios should remain current and relevant with new doctrinal concepts and capabilities.

Along with new doctrinal concepts, exercises should reflect current capabilities of fielded systems. Design methodologies using historical data without incorporating new systems and capabilities offer an incomplete assessment of an operation. Imagine how flawed an Air Force exercise would be if it used Army of Excellence doctrine and units as the basis of the land component commander's fight without incorporating all of the modularity changes and fielded systems. The Army would justifiably question the value of such an exercise as it would portray a less-capable force. Likewise, Army exercises should update JFACC capabilities and concepts in order to have credible results and to facilitate comprehension of joint issues, employment and capabilities. Exercises involving more than one joint service should enhance each other's understanding of their capabilities.

An accurate replication of airpower concepts and capabilities, based on current systems and recent operational experience, serves to better train Army staffs on how to leverage JFACC capabilities. The design of exercise starting conditions can help shape the Army's visualization of the effects of airpower by demonstrating the JFACC's capabilities and limitations. This understanding better shapes planning, guidance, and ultimately, leveraging the air component during operations.

CHAPTER 2

LITERATURE REVIEW

Lessons Learned

The conduct of Operations Enduring Freedom and Iraqi Freedom gave each service ample opportunity to reflect on how well or poorly it did with respect to a myriad of situations. While certain aspects of major combat operations of each campaign are still under study, there is enough evidence and analysis to examine some key lessons learned from the services which may impact how the Army designs training scenarios in the future. Two key lessons learned are the continuing need to portray Army exercises in a joint context and the role of airpower in shaping the operational environment at the strategic and operational levels.

The Commanding General of US Army Training and Doctrine Command (TRADOC) recently tasked the Center for Army Lessons Learned (CALL) to review recent OIF-OEF-JTF-HOA lessons learned and to provide a report outlining training trends and gaps where the Army should consider incorporating "joint context" into training (CALL 2006, ii). Among many things, CALL recommended that:

Command post exercise scenarios for a corps preparing for joint missions must be set in a joint, interagency, intergovernmental and multinational (JIIM) operational setting. JIIM elements must participate with the corps in those exercises. Corps taking over joint functions need to be exposed to training events that emphasize multinational unit participation. HQDA and JFCOM should examine means and ways to enable this operational environment to be effective. (CALL 2006, iii)

This recommendation is relevant in three ways to creation of starting conditions. First, portraying Army scenarios in a joint context ensures that the training audience understands how the exercise nests within a joint operation. Second, it requires the staff

to balance second- and third-order effects of targeting decisions. This is particularly important when the JFACC shapes prior to JFLCC operations. Finally, it portrays the role the JFACC plays in supporting the JFC's objectives, particularly when shaping the OE in support of the JFLCC.

Fundamental to any operation is the idea of nested concepts. FM 5-0 defines nested concepts as "a planning technique to achieve unity of purpose whereby each succeeding echelon's concept of operations is embedded in the other (2005, 1-15). By nesting with the joint task force concept, subordinate components ensure that their operations and decisions always reflect the needs of the JFC. This is especially important with respect to targeting.

Joint doctrine defines targeting as "the process of selecting and prioritizing targets and matching the appropriate response to them, taking account of operational requirements and capabilities" (JP 3-60 2002, I-2). This implies more than the management of a target list. It requires that the joint staff analyze operational requirements, choose targets best suited to meeting those requirements, and determine the best means by which to attack those targets. Moreover, the staff must understand the consequences of striking certain targets, especially when the potential for collateral damage exists. Thus, the staff must weigh the costs and benefits of each target and understand the impacts of targeting decisions as the campaign progresses. This may force targeting staffs to choose less than optimal means of attacking targets in order to prevent or mitigate deleterious effects. While this reality exists, it does not diminish the ability of the air component to shape the OE in support of the land component.

OIF experience shows that the air component is capable of sustaining robust sortie generation rates for a length of time. For example, they generated 41,404 sorties in support of OIF in just 29 days, averaging over 1,400 per day (*OIF By the Numbers* 2003, 7). This allowed Central Air Forces (CENTAF) to strike almost 20,000 desired mean points of impact (DMPI) in that time period with a loss of only 14 aircraft (*OIF By the Numbers* 2003, 3). Most significantly, the 20,000 or so DMPIs struck account for about 80 percent of all DMPIs attacked during the major combat operations phase. These figures suggest the capability to generate effective combat sorties in support of JFLCC operations with little interference due to enemy forces.

In comparison, Army aviation shaping efforts paled in comparison to the JFACC. The V Corps directed two deep attacks during OIF which generated fewer than eighty sorties (Johnson 2006, 157). During the sandstorm when all Army aviation could not fly, JFACC sorties still struck Iraqi targets. Even if one adds in the number of ATACMS strikes by Army artillery units--414 in all--the sum of Army aviation and long-range rocket artillery missions fired is about two orders of magnitude less than that generated by the JFACC. Johnson concludes by recommending that, "the task of shaping the theater--strategically and operationally--should be an air component function, and joint and service doctrines and programs should change accordingly (Johnson 2006, 190). If the JTF commander is to shape the OE, then the JFACC seems best suited for this role at the strategic and operational level.

Joint Doctrine

The strategic and operational doctrine used to plan and execute joint operations is known as the Joint Operation Planning Process (JOPP). The JOPP is an orderly,

analytical planning process, which consists of a set of logical steps to analyze a mission; develop, analyze, and compare alternative courses of action; select the best COA; and produce a plan or order (JP 5-0 RFC 2006, III-1). A second process used to plan joint operations is known as operational design. Operational design is complementary to the JOPP in that planners conceive and construct a framework using design elements which underpin a joint operation plan and its subsequent execution (JP 5-0 2006, III-1).

Several elements of operational design are important to the understanding of planning and executing joint operations. These elements are termination, endstates and objectives, and effects. Termination is first discussed since operations cannot occur without a clear understanding of the endstate and the conditions that must exist to end military operations (JP 5-0 2006, IV-8). Operational planning begins with strategic guidance from the President and Secretary of Defense and culminates in the formulation of theater strategic objectives and military endstate by the combatant commander. This endstate normally represents a point in time or circumstance beyond which the President does not require the military instrument of national power to achieve remaining objectives of the national strategic endstate (JP 5-0 RFC 2006, IV-9). In order to achieve the strategic endstate, planners must create operational objectives which will focus the actions of each JTF component. The accomplishment of the operational objectives will bring about the strategic endstate.

Operational objectives provide components, such as the JFLCC and JFACC, enough specificity to conduct a mission analysis which will allow them to refine these objectives into tasks which must be accomplished to accomplish the assigned objectives. Here the use of effects is important. Effects connect strategic and operational objectives

to tactical tasks through identifying desired and undesired effects within the operational environment (JP 5-0 2006, IV-10). The full set of these effects would represent the necessary and sufficient conditions for achieving the strategic objective (JP 5-0 2006, III-13). Thus, effects link tasks and objectives and define the conditions necessary to achieve strategic success.

Effects phrasing should meet four criteria. These criteria are important so that commanders and staffs can distinguish effects from objectives or tasks.

First, each effect should link directly to one or more objectives; next, the effect should be measurable; third, the statement should not specify ways and means for accomplishment; finally, the effect should be distinguishable from the objective it supports as a condition for success, not as a subordinate objective or task. (JP 5-0 2006, III-14)

In short, an effect statement should demonstrate linkage to the objective, it is measurable, it does not specify how and with what to accomplish the objective, and it is not another objective or task to accomplish. This provides clear doctrinal guidance for determining what an effect is and how planners should phrase it. For example, an operation may involve the attack of an enemy force into a sovereign nation. The combatant commander (CCDR) may determine that one objective should be that, “If deterrence fails, defeat Red’s attack and eject Red’s forces from friendly states” (JP 5-0 2006, III-12). In this example, the CCDR designated the following three effects to achieve the objective:

E-7: Faced with US military superiority, Red forces surrender

E-8: Short of surrender, Red military capabilities are rapidly degraded to the point that effective Red military operations are not possible

E-9: The integrity of friendly countries’ borders is restored

Effect E-8, for example, meets the standard set forth in the four criteria. It is directly linked to the objective of defeating Red’s attack by focusing JTF operations against Red’s military capabilities to the point that effective Red operations are not

possible. The CJTF can measure the creation of this effect by observing Red military operations. If enemy operations are effective or his capabilities are not rapidly degraded, then the JTF has failed to create this effect. The effect statement does not specify the ways or means by which the JTF will create this effect; it simply states that the JTF will degrade Red's capabilities such that effective operations are not possible. Finally, the effect statement is not a task or objective. A task to support the creation of this effect may be, "Destroy 90 percent of Red's Air Forces prior to D+7." This would be one task of many which planners would require performing to degrade Red's military capabilities to the extent that effective Red military operations are not possible.

How do planners know where to focus JTF efforts to achieve a desired set of effects? The answer, according to emerging doctrine, lies in analyzing the OE as a system of systems. A system is defined as, "A functionally, physically, and/or behaviorally related group of regularly interacting or interdependent elements; that group of elements forming a unified whole" (JP 5-0 2006, IV-7). Examples of systems include political, military, economic, social, informational, infrastructure (PMESII), and others (JP 5-0 2006, IV-7). This expansive view of the OE is required at the strategic and operational levels of war because the military system of a nation is connected to each of the other systems. Since operations against some of these other systems (information, social, political, economic) involve the use of other elements of national power (diplomatic, economic, information), a broader perspective enhances the JFC's knowledge of how individual actions on one element of a system can affect other interrelated system components (JP 5-0 2006, IV-6).

In order to understand how an individual system behaves or how it is related to other systems, analysts must further define each system as a series of nodes and links. Nodes are "an element of a system that represents a person, place or thing" (JP 5-0 2006, IV-7). In the military system, a node could be a command post, leader of a particular force, or a key place or facility such as a ministry of defense.

Nodes are related to each other through links. A link is "a element of a system that represents a behavioral, physical, or functional relationship between nodes (JP 5-0 2006, IV-7). A link could be "the command or supervisory arrangement that connects a superior to a subordinate; the relationship of a vehicle to a fuel source; and the ideology that connects a propagandist to a group of terrorists" (JP 5-0 2006, IV-7).

Links establish the interconnectivity between nodes that allows them to function as a system—to behave in a specific way (accomplish a task or perform a function). Thus, the purpose in taking action against specific nodes is often to destroy, interrupt, or otherwise affect the relationship between them and other nodes, which ultimately influences the system as a whole. (JP 5-0 2006, IV-7)

By understanding how nodes and links comprise a system and how they are related, planners can predict how they will behave once influenced.

Given all of the possible nodes and links that comprise a given system, planners must determine which nodes to influence in order to create the desired effect. These nodes are known as key nodes which are defined as "a node that is related to a strategic or operational effect and/or a center of gravity" (JP 5-0 2006, IV-7). This distinction creates an important subset of a system which allows commanders to focus operations against selected, essential key nodes. If the relationships and identification of these key nodes have been correctly done, then influencing them will yield the desired effects against a COG.

In systems analysis, a COG is defined as “the set of characteristics, capabilities, and sources of power from which a system derives its moral or physical strength, freedom of action, and will to act” (JP 5-0 2006, IV-10). These could be military forces, leaders, national will, or other key components of a system. A COG typically will not be a single node in the system, but will consist of a set of nodes and their respective links (relationships) (JP 5-0 2006, IV-12). Identifying which of these comprises the center(s) of gravity is vital to the process. Based on the doctrinal definition of a center of gravity, the test is to determine which of these elements the enemy derives freedom of action, physical strength (means), and the will to fight (JP 5-0 2006, IV-13). If a node or link does not contribute to one of these three factors, then it is not a center of gravity.

Identifying the correct centers of gravity for a system is important since “the essence of operational art lies in being able to produce the right combination of effects in time, space, and purpose relative to a COG to neutralize, weaken, defeat, or destroy it. In theory, this is the most direct path to mission accomplishment” (JP 5-0 2006, IV-11). Thus, systems analysis provides another way to construct operations designed to attack or influence enemy centers of gravity, thereby achieving operational and strategic objectives and endstates.

To attack a center of gravity, commanders and staff must analyze how the COG is vulnerable to attack or influence. This is done by analyzing the COG in a framework of critical capabilities, resources, and vulnerabilities (JP 5-0 2006, IV-13). These three items are known as critical factors. This framework provides planners with clues as to which factors of a COG to attack. The JFC’s goal is to seek opportunities aggressively to apply asymmetrical force against an adversary in as vulnerable an aspect as possible, and in as

many dimensions as possible (JP 5-0 2006, IV-15). This provides a theoretical basis for the use of force against aspects of a center of gravity which, when attacked and destroyed, yields the desired operational and strategic effects desired.

The final component of center of gravity analysis is identifying decisive points (DP). A decisive point is “a geographic place, specific key event, system, or function that, when acted upon, allows a commander to gain a marked advantage over an adversary or contributes materially to creating a desired effect, thus greatly influencing the outcome of an action” (JP 5-0 2006, IV-17). By analyzing the critical factors of a COG from a systems perspective, planners determine which nodes and links are decisive points. These could be numerous, more so than capable of attacking. If more DPs exist than the JTF can attack, then planners should study and analyze potential decisive points and determine which of them offer the best opportunity to attack the adversary’s COGs indirectly, extend friendly operational reach, or enable the application of friendly forces and capabilities (JP 5-0 2006, IV-18). This approach ensures that commanders commit resources to attacking the most lucrative targets in the area of operations.

From the systems-based approach to analyzing the operational environment, it is possible to construct a model of how an enemy force and its associated systems interact once attacked or influenced. To do this, the joint force continuously applies the following three steps in order to execute this type of operation: (1) locating and monitoring key systems, (2) directing actions against key nodes within those systems and (3) assessing the system effects of those actions (JWC 2006, IV-2). In other words, the joint force will conduct ISR operations in order to target key nodes and then assess the effectiveness of

those operations. To plan ISR operations effectively, intelligence analysts must construct a model of how the enemy system operates and behaves.

The process staffs use to construct models of enemy forces is known as intelligence preparation of the battlespace or IPB. When conducted by a joint staff, it is known as joint IPB or JIPB. JP 2-01.3 defines JIPB as, “The analytical process used by joint intelligence organizations to produce intelligence assessments, estimates, and other intelligence products in support of the joint force commander’s (JFC’s) decision making process” (JP 2-01.3 2000, I-1). This continuous process involves the following four steps: (1) defining the total battlespace environment; (2) describing the battlespace’s effects; (3) evaluating the adversary; and (4) determining and describing adversary potential courses of action (COA) (JP 2-01.3 2000, I-1). This is the basic process that staffs from all components have used over the years to analyze enemy forces.

Effects proponents argue the IPB or JIPB is too narrow to support the expanded view of the operational environment. JFCOM argues that “the JIPB is often a derivative of the Service or functional component's intelligence preparation of the battlespace (IPB). This practice may lead to a JIPB that is focused too narrowly on the military instruments of power within the OA” (JWC 2006, II-5). The solution, in the effects proponent’s mind, is to embed a system of systems analysis of the operational environment to include other systems such as political, economic and social. This will increase the breadth and depth of the JFC's and staff's understanding of the OE (JWC 2006, II-5). The goal of such an approach is, “Predictive intelligence with regard to the adversary's probable intent and most likely COAs for countering friendly operations” (JWC 2006, II-5). This goal is no more different than that of IPB, except for the approach taken. In emerging doctrine,

JIPB will be renamed JIPOE or joint intelligence preparation of the operational environment.

Planning intelligence operations using JIPOE follows the same four steps as JIPB, except for the use of a systems approach to understanding an adversary. Step four of JIPOE, Determining Adversary Courses of Action, ends with the identification of initial intelligence collection requirements for adversary, friendly, and unaligned systems (JWC 2006, II-8). This initiates collection management planning in order to confirm or deny adversary courses of action.

JP 2-01 defines collection management as a process that “converts validated intelligence requirements into collection requirements; establishes, tasks or coordinates actions with appropriate collection sources or agencies; and monitors results and retasks as required” (JP 2-01 2004, III-11). The collection management process is the principle means by which the joint force validates and sources intelligence requirements. This process is composed of two major functions: collection requirements management and operations management.

Collection requirements management focuses on the requirements of the customer, is all-source oriented and advocates what information is necessary for collection (JP 2-01 2004, III-13). In terms of JIPOE, collection requirements management would focus on the generation and validation of intelligence requirements to inform the CCDR as to the makeup and behavior of the adversary from a systems perspective. While the type of intelligence gathered may differ under this approach, the process used to validate the requirement should not differ. While emerging doctrine does not yet speak of collection management from a systems perspective, one can assume that the validation

process would not differ under new doctrine. Since validation is merely a decision support mechanism, this assumption should hold true.

Once the CCDR approves the collection requirements, operations managers task resources against those requirements. Collection operations management is the process which, “Focuses on the selection of the specific intelligence discipline(s) and specific systems within a discipline to collect information addressing the customer’s requirement” (JP 2-01 2004, III-13). This is the execution and assessment of the collection management plan. This process is depicted in figure 2.

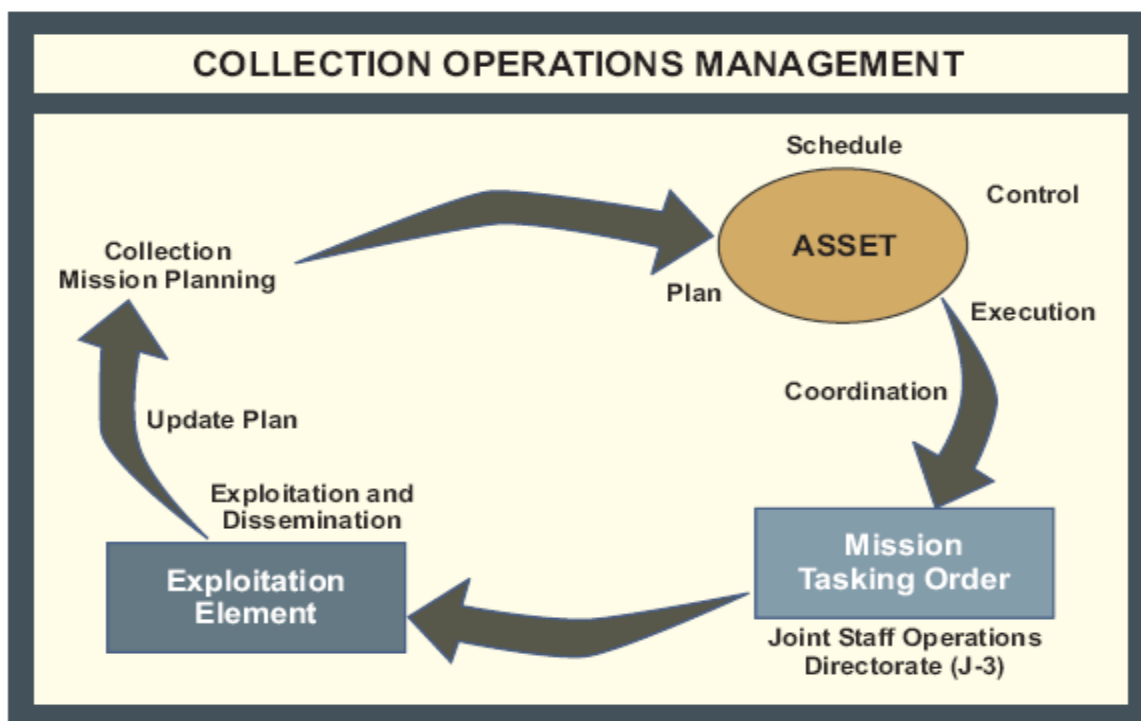


Figure 2. Collection Operations Management
Source: Chairman of the Joint Chiefs of Staff, *Joint and National Intelligence Support to Military Operations* (Washington, DC: CJCS 7 October 2004).

From the diagram, collection operations management is a four step process. The first step is mission planning based on a set of requirements. These requirements are matched against an appropriate collection asset in step 2. Once assets are matched to requirements, the J-3 would task components owning those assets in step 3. Once components report the results of the collection mission, this intelligence is exploited and disseminated. This final step results in the assessment of existing and proposed collection requirements against the plan and may require an adjustment as needed.

Normally, collection management and planning occurs in the intelligence section of the joint task force staff. Depending on the commander and operational needs, the JFC may form a joint collection management board (JCMB). The purpose of the JCMB is to “serve as a joint forum for the management of collection requirements and the coordination of collection operations” (JP 2-01 2004, III-16). With assistance from the J-3 and components, the J-2 collects target nominations, validates and prioritizes these requirements, and recommends the apportionment of ISR assets to meet these requirements (JP 2-01 2004, III-16). This process, similar to a targeting coordination board, ensures that the JFC’s collection requirements are resourced and that duplicative efforts are deconflicted.

Commanders generate collection requirements through a variety of means. One process which generates a significant amount of collection requirements is the targeting process. Targeting is defined as “the process of selecting and prioritizing targets and matching the appropriate response to them, taking account of operational requirements and capabilities” (JP 3-60 2002, I-2). This six-step process is a means by which the joint

force commander influences the operational environment. These steps are shown in figure 3:

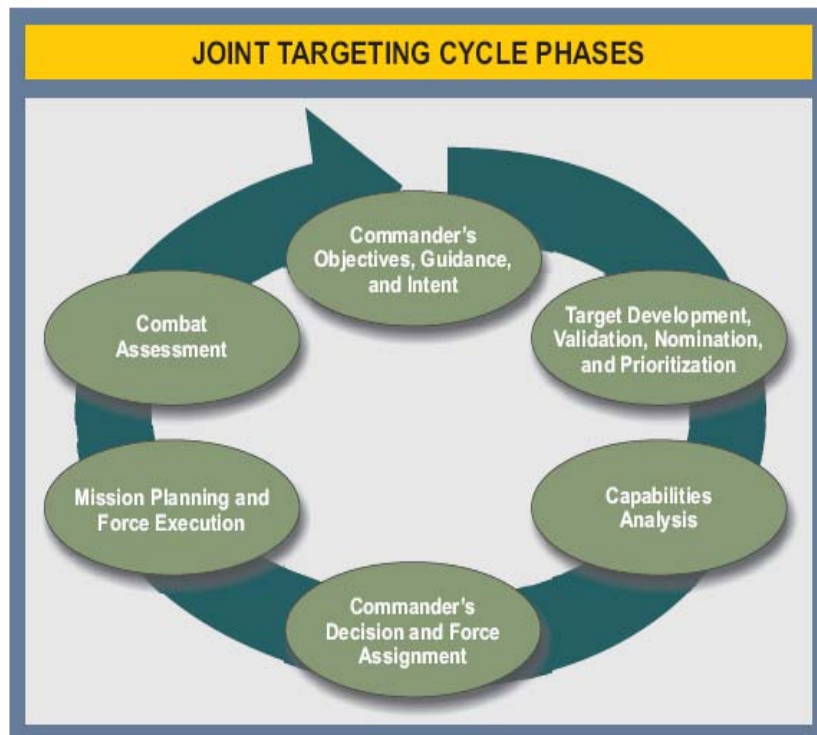


Figure 3. Joint Targeting Cycle

Source: Chairman of the Joint Chiefs of Staff, *Joint Doctrine for Targeting* (Washington, DC: CJCS, 17 January 2002).

The basis for any target is the mission's objective. Based on an analysis of the mission, the commander formulates guidance and intent. This guidance drives the subsequent phases of the targeting cycle by establishing clear, quantifiable, and achievable objectives which lead to the successful realization of national security goals through a targeting solution (JP 3-60 2002, II-1). By rooting the targeting process in the

commander's intent and guidance, commanders try to ensure that targeting outcomes lead to accomplishing the strategic endstate of the mission.

In order for targeting to support mission accomplishment, staffs at the JTF and component levels must develop targets to support the operation. This is done by analyzing the operational environment and assessing what aspects and capabilities of an adversary must be attacked in order to bring about the desired effects. The net result of target development is to produce a target nomination list (TNL) that identifies those elements within an adversary's power base that most closely support the JFC's objectives (JP 3-60 2002, II-5). This requires the JFC to establish a mechanism to consolidate, validate, and prioritize the target list.

This mechanism is done several ways. The first is under the control of the J-3 staff who would oversee the consolidation, validation and prioritization of the joint target list. Another way is through the use of the joint targeting coordination board (JTCCB), normally a JFACC responsibility. Either way is valid but ultimately the responsibility of the targeting effort lies with the combatant commander (JP 2-01.1 2003, I-4). This ensures unity of effort, particularly when one JFACC resources multiple areas of operation, as is occurring today at CENTCOM.

Each service has a liaison element at the JAOC who coordinates the air support needs of the service they represent. For the Army, this organization is known as the battlefield coordination detachment (BCD). The BCD is responsible for "exchanging current intelligence and operational data, support requirements, coordinating the integration of ARFOR requirements for airspace control measures (ACM), joint [fire support coordination measures] FSCMs, and theater airlift" (JP 3-09 1998, II-7). It is the

BCD who ensures that Army requirements are given consideration during the joint targeting cycle through liaison and representation on JFACC-led boards such as the JTCB.

Perhaps the most important role of the BCD is to coordinate the myriad of air support requests from Army forces to the Air Force. In the early stages of the campaign when Army forces are deploying, the BCD, “processes the ground component’s target nominations and acts throughout planning and execution to ensure proper representation of ground component priorities in the overall process” (AFDD 2-1.3 1999, 51). These priorities reflect the JFLCC’s expertise in conducting ground combat and serve to provide subject-matter expertise to shape the composition of the JIPTL. Just as air liaison elements provide their expertise to Army units in the employment of airpower, likewise does the BCD to the JFACC.

It is during this second phase of the joint targeting cycle where collection management and the targeting cycle meet. Targeteers generate collection requirements in order to validate and update target information. For some types of targets, this may be done through national means and requires coordination with other combatant commands. For most targets, this is done using organic assets within the JTF. This intelligence support is vital for the analysis performed in target development, as well as to prepare for future targeting during the execution of operations and to support post-attack assessment of success (JP 3-60 2002, II-3). The end result of this process is a target nomination list which the staff will forward to the commander for approval.

Before the commander can approve the list, the staff must resource the target list using available forces. This analysis involves more than matching platforms, munitions

and targets. It takes into account the vulnerability or lack thereof of the target to attack or influence. Ultimately, the staff selects the most promising forces for application against those targets (JP 3-60 2002, II-5). This step ensures feasibility, acceptability and suitability of the targeting plan. Once drafted, the staff forwards this recommendation to the commander for approval.

The fourth step of this process is gaining the commander's approval and force assignment. The staff's targeting recommendation, once approved, becomes the joint integrated prioritized target list (JIPTL). With the JIPTL, tasking orders are prepared and released to the executing components and forces (JP 3-60 2002, II-7). This documentation trail is important for subordinate headquarters because it facilitates understanding of the linkage between the target and the objective. By providing the analytical reasoning behind the nomination and the estimate used to generate the tasking, subordinate planners can adjust and fine-tune operational planning as well as discuss mitigation of risk for the attacking force (JP 3-60 2002, II-7). This audit trail is useful in ensuring unity of effort and purpose since the attacking forces will generally operate at the tactical level while the effect generated from attacking the target may well be operationally or strategically significant.

These orders lead to the fifth step which is mission planning and force execution. Here again, providing tactical planners with direct access to detailed information on the targets, supported by the nominating component's analytical reasoning that linked the target with the desired effect is important (JP 3-60 2002, II-8). Since this process is centrally planned, each target struck has some measure of value toward accomplishing an operational or strategic objective. Ensuring that the subordinate components understand

the “why” of the target’s importance promotes initiative at lower levels when conditions on the battlefield will disrupt mission execution. This fits well with the task and purpose methodology that underpins Army planning.

The final step in the targeting cycle is combat assessment. Combat assessment (CA) consists of three interrelated components, “battle damage assessment (BDA); munitions effectiveness assessment (MEA); and future targeting or reattack recommendations” (JP 3-60 2002, II-9). CA is not synonymous with BDA; it encompasses it. The endstate to the CA process is the determination if the required effects on the adversary envisioned in the campaign plan are being achieved through targeting and other efforts (JP 3-60 2002, II-8). This links campaign success with the attainment of desired effects through targeting and provides a way by which the commander can determine how successful he is in accomplishing his objectives.

Commanders use BDA as the activity in determining the success of the targeting effort. This three-phased approach begins with the reporting of the effects on the specific target struck and ends with a macro-level assessment of the target system (JP 3-60 2002, II-9). For example, attacking an electrical generation plant may be a target. BDA begins with the pilot or analyst’s assessment of the physical damage caused by the attack. Based on that assessment, analysts begin to make judgments of the plant’s ability to function. They may assess that the plant is incapable of producing power for a certain period of time. This in turn would lead to conclusions about the overall effect on the power grid in the region or country affected. This assessment is matched against the desired effect and the staff would recommend reattack or targeting if necessary based on success or failure of achieving the effect required by the commander.

In order to assess the effects of targeting, measures of effectiveness and performance are needed to assist the staff in portraying success or failure to the commander. Measures of effectiveness (MOE) are “designed, first, to help refine the set of effects statements during planning and, second, to give JFCs tangible indicators that the operation is ‘doing the right things’ during execution” (JWC 2006, III-10). They are directly linked to the effect. On the other hand, measures of performance (MOP) are, “measurement[s] of task accomplishment. The principal aim of this assessment is to discover if ‘things were done right’” (JWC 2006, III-10).

This analytical model is vital to the targeting process. By maintaining a standard measure of targeting effectiveness, they (MOEs and MOPs) help drive the conduct of military operations against target systems in a more effective systematic fashion — achieving results at a greatly reduced effort, risk, and cost (JP 3-60 2002, II-10). While this process is time and effort intensive, the payoff is an efficient means by which the commander measures the success of his operation.

In summary, the use of effects is important in joint doctrine as it provides a framework by which the combatant commander or JFC can shape the operational environment. By creating conditions favorable to the accomplishment of strategic and operational objectives, effects have reaching impact to the JTF and its subordinate components in many domains. Effects, by focusing on military as well as non-military systems, influences strategic and operational level systems in ways doctrine did not account for previously. The impact on subordinate staffs is that the type of intelligence and effects generated will be much broader than just the military system. In the future, staffs at all levels must deal with social, political, economic and other non-traditional

categories of systems. Understanding how those systems influence the military system is equally important since an adversary's military is never attacked in a vacuum.

Two functional processes, ISR and targeting, enable the commander to understand and shape the operational environment. Through collection management, the commander can identify those aspects of the operational environment that are lucrative for targeting, particularly areas where a center of gravity is vulnerable. Through analysis, the staff attempts to predict the effects of targeting. Collection management assists the commander by providing pre- and post-strike intelligence which informs analysts about the 2nd and 3rd order effects of targeting.

The joint targeting cycle is an important function of the joint task force staff. Through its own analysis and with input from subordinate components, the staff conducts a deliberate analysis of targeting requirements and recommends to the commander those targets which suit the attainment of objectives. Methods such as MOEs and MOPs provide a quantitative and qualitative approach to understanding success or failure of the operation.

Any scenario which trains an Army staff at the corps or division level must reflect a joint environment and how the joint force commander views the operational environment as a system of systems. Recent experience in OIF and OEF demonstrates that corps and divisions operate in a microcosm of the operational environment where all systems, not just the military, are important. While the staff expertise and responsibility to address political, social and economics issues may not exist within corps and divisions, those issues are resident in any corps or division operation. Given that non-military

systems affect Army operations, training scenarios which include them into the overall operational environment can help Army staffs understand their influence on operations.

Likewise, the degree to which a scenario reflects jointness should reflect the doctrine, organizations and processes at the combatant command and JTF-level. Since the CDR or JFC use forums such as the JCMB and JTCB to apportion assets to priorities, Army scenarios should ensure that those processes are portrayed in the scenario both in the planning and execution phases. This facilitates training in a joint environment and helps provide an audit trail which links the theater campaign plan to asset allocation in support of the CDR's objectives.

JFACC Doctrine

As a joint task force is built, multiple services contribute similar forces for the operation. On land, Marines and Soldiers form the land component. Likewise, air components from the Navy, Air Force, and Marine aviation form the air component. To exploit these capabilities, the JFC will normally designate a JFACC (JP 3-30 2003, I-2). This places all of the airpower capabilities under one, responsible commander. While the Navy or Marine Corps can provide the JFACC, the Air Force normally provides the staff, facilities and commander for the JFACC. Regardless of service makeup, this ensures that the JFACC exercises unity of command over all aerospace operations.

The JFC will proscribe what responsibilities the JFACC has. While the set of responsibilities varies due to the unique needs of each operation, joint doctrine provides a baseline set of what these should be. These are outlined in figure 4.

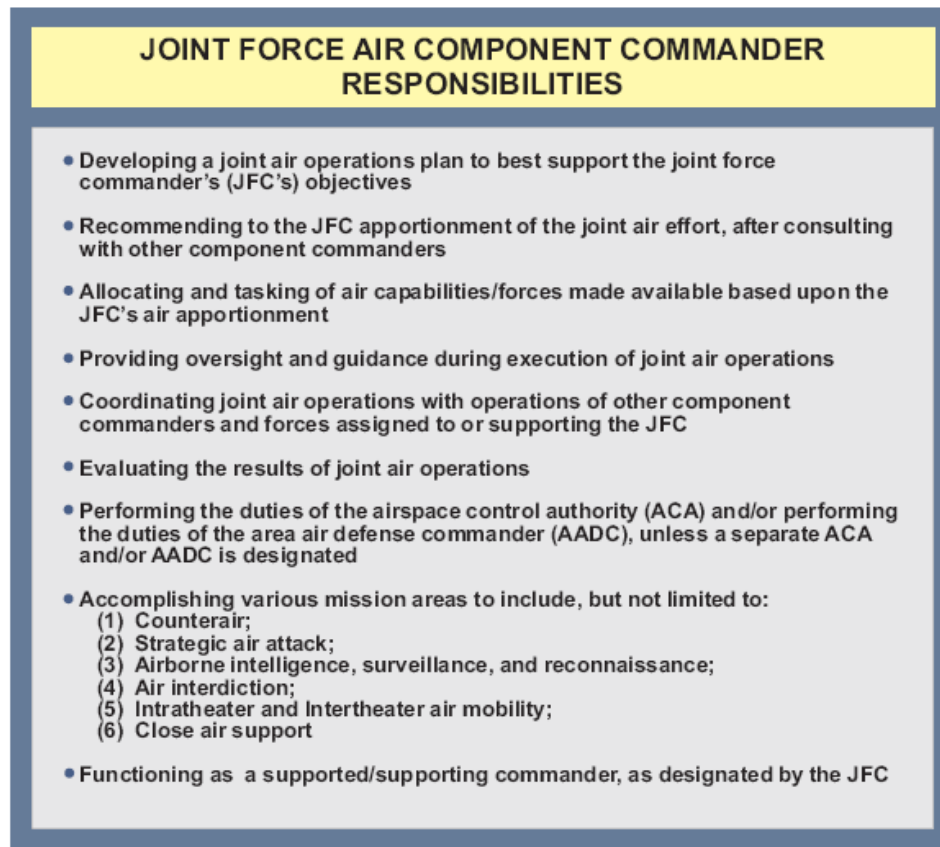


Figure 4. JFACC Responsibilities

Source: Chairman of the Chiefs of Staff, *Command and Control for Joint Air Operations* (Washington, DC: CJCS, 5 June 2003).

If Army scenarios are to integrate the role of the JFACC in shaping the OE, then the scenario must portray an integrated JFACC C2 structure from the Air Operations Center (AOC) down to the execution level. This is because JFACC doctrine stipulates that airpower is centrally planned but executed decentralized (JP 3-30 2003, I-3). This fosters unity of command for all air assets from all services and promotes initiative, responsiveness and flexibility (JP 3-30, 2003, I-3). If scenarios portray anything less than a centralized C2 structure, then the scenario may not fully demonstrate how the JFACC

organizes for combat. The JFACC organization responsible for this planning and execution is the JAOC.

The AOC, JAOC when supporting the JFACC, is “a jointly staffed facility established for planning, directing, and executing joint air operations in support of the joint force commander’s operation or campaign objectives” (JP 3-30 2003, GL-6). Simply put, the JAOC is the JFACC’s command post where he plans, allocates and executes operations in support of the JFC. The JAOC is doctrinally organized with five cells to support the JAOC through various cells which serve important functions. Three of these cells are directly related to the question of starting conditions. These are the strategy cell, combat plans cell, and the ISR cell.

The strategy cell of the JAOC is responsible for developing, refining, disseminating, and assessing the progress of the JFACC’s strategy through long-range planning (JP 3-30 2003, C-1). This cell analyzes the JTF plan, develops the air operations plan and assesses how well or poorly the JFACC accomplishes the objectives specified by the CJTF. If necessary, they will issue guidance to adjust or refine current operations in order to give operational level planners the information they need to allocate sorties to meet JFC objectives within imposed risk constraints (JP 3-30 2003, C-1). This process ensures that the long-range objectives are met while accounting for the daily actions on the battlefield. The strategy cell does not allocate airpower; this is the responsibility of the combat plans division.

The combat plans division is responsible for the near-term operations planning function of the JAOC. This division develops detailed plans for the application of air resources based on JFACC-approved guidance received from the Strategy Division (JP 3-

30 2003, C-2). Some of the products developed and issued by combat plans include the Joint Integrated Priority Target List (JIPTL), ATO, and the Master Air Attack Plan (MAAP). The relationship between these three documents drives how the JFLCC sees JFACC effects on the battlefield. The JIPTL as the name implies is the JFC's priority target list. The MAAP is the JFACC's plan to use airpower to attack targets on the JIPTL per JFC guidance. The ATO is the product which tasks subordinate units to attack targets on the JIPTL based on the MAAP. Thus, these three products drive how targets are chosen for attack. Tables 1 and 2 show an example of a JIPTL and MAAP.

Table 1. Example of a JIPTL

Target	#	RANK	PREV
Destroy attacking enemy surface forces in contact	G2-1	1	1
C2 of enemy air defense forces in ZOC 3 and ZOC 4	A2-1	2	2
Destroy advancing enemy operational reserve heavy units	02-3	3	9
Disrupt logistics support of enemy operational reserve	02-4	4	19
Attrit advancing enemy 1st/2d echelon divisions by 50%	H2-3	5	3
Destroy enemy artillery attacks on Phantom airfield	A2-5	6	5
Disrupt C2 of enemy operational reserve	02-2	7	8
Support JFMC maritime superiority operations	M2-1	8	10
Degrade enemy ISR assets	I2-2	9	18
Degrade enemy air-to-ground fighter capability	A2-4	10	13
Degrade enemy air superiority fighter capability	A2-3	11	14
Destroy enemy TBM capability	A2-6	12	15
Destroy enemy radar guided SAM threat vic PMF	A2-2	13	16
Attrit helicopter units supporting enemy advance	H2-4	14	17
Shape/delay enemy operational reserve advance toward PMF	02-1	15	20
Disrupt C2 of enemy 1st/2d echelon divisions	H2-2	16	21
Disrupt logistics support of enemy 2d echelon divisions	H2-5	17	11
Shape/delay enemy ground force advance	H2-1	18	12
Deny enemy use of space-based navigation	S2-6	19	22

Source: Department of the Air Force, *Air Warfare* (Washington, DC: USAF, 22 January 2000).

Table 2. Example of a Master Air Attack Plan

<u>TOT</u>	<u>MSN#</u>	<u>TGT</u>	<u>DESCRIPTION</u>	<u>AIRCRAFT</u>
H-15	63819	A011	COMMAND POST	1 F-117
H-10	6302C	A09	ALERT FIELD	2 F-117
0000	6554D	AS034	AIRCRAFT FUEL	4 F-15E
0000	43821	SAD32	EW/GCI PLATFORM	4 F-16
0000	43822	N/A	AREA SEAD	4 EA-6B
0000	43823	N/A	AREA/HVA CAP	4 F-14
0000	5103R	AR71	AAR TRACK	3 KC-135R
0025	0255U	CCC01	NATIONAL C2	2 F-117
0000	33717	INT37	RAILROAD BRIDGE	4 Tornado
0115	3212A	INT16	POL STORAGE	2 F-15E
0125	2714G	CP A4	CAS	4 A-10

Source: Department of the Air Force, *Air Warfare* (Washington, DC: USAF, 22 January 2000).

One crucial function of combat plans is the Joint Guidance, Apportionment, and Targeting (JGAT) team. The JGAT team develops the daily JFACC planning guidance, air component target nomination list, and air apportionment recommendation (JFACC guidance letter) (JP 3-30 2003, C-2). If apportionment decisions impact the components in any fashion, the JGAT team's recommendation is usually the source. While the apportionment may change over time, it is important for all components to have representation and input in order to anticipate resource changes as well as keep their component commanders informed of the JFACC's guidance.

Akin to the JGAT team formulating planning and apportionment guidance, the JFC may form a joint targeting coordination board (JTCB) to facilitate and coordinate the targeting activities of the components to ensure that the JFC's priorities are met (JP 3-30

2003, III-17). An ad hoc board, the JTCCB is normally delegated to the JFACC and conducted as a daily meeting in the JAOC. Each component has representation on this board. This provides a forum where the components can articulate strategies and priorities for future operations to ensure that they are synchronized, integrated and most importantly, deconflicted (JP 3-30 2003, III-17). If formed, the JTCCB refines the JIPTL for the JFC's approval.

The final cell is the ISR cell. While responsible for providing ISR to the JAOC, joint force, and subordinate units, the cell is also responsible for appropriate ISR reporting, planning, tasking, and deconfliction to build a common all-source threat and targeting picture (JP 3-30 2003, C-4). This is done when the JFC designates the JFACC as the collection management authority. Much like how combat plan orchestrates the targeting process, the ISR cell orchestrates ISR planning to ensure that the JTF has the most accurate picture of the OE as possible.

The collective work of these boards, centers and cells strives to produce plans and operations that accomplish the objectives specified for the JFACC. The means by which the JFACC generates missions for aerospace units is the air tasking cycle (see figure 1 from chapter 1). According to Air Force doctrine, the air tasking cycle is an interrelated series of actions that begins with the JFC's guidance for the cycle period and results in the publication of the ATO (AFDD 2-1 2000, 49). This continuous cycle provides a repetitive process for planning, coordination, allocation, execution, and assessment of air missions (AFDD 2-1 2000, 50). The ATO provide air and ground components alike with the visibility of what the JFACC is doing at all times.

By merging the responsibilities of the JFACC with the boards, centers, and cells that assist the JFACC in planning air operations, one can get an idea of how airpower is planned, coordinated and executed. The JGAT team and strategy cell analyzes the JFC's mission and objectives and recommends an apportionment of airpower to the JFACC and JFC. Once the JFC approves or modifies the apportionment recommendation, the combat plans division analyzes available assets and develops the MAAP. A feeder for the MAAP is the JIPTL. The JIPTL, approved by the JTCCB with input from the JFC's and components' staffs, provides the targeting guidance necessary to produce the MAAP. The melding of these two documents results in the ATO. The AO represents the formal plan which provides operational and tactical direction for air operations (AFDD 2-1 2000, 49).

Simultaneously while the combat plans cell produces the ATO and associated products, the ISR cell coordinates the aerial and space-based collection requirements needed to execute and assess the effects of air operations. The execution phase, conducted by tasked units in the ATO, results in a series of events on the battlefield which require assessment. Based on the JFC's objectives and the results of air operations, the strategy cell assesses the overall effectiveness of the JFACC's operation through the use of MOEs and MOPs (AFDD 2-1 2000, 50). Based on the progress of the operation, the strategy cell may determine that changes in apportionment are needed. This inputs feedback into the ATO production cycle and continues until the operation terminates.

In the planning and preconflict phases of the operation, the JFACC has an enormous role in shaping the conduct of the joint campaign. By bringing all of the components together at the JAOC, the JFACC can formulate recommendations for targeting and ISR guidance to support the JFC's campaign. Through the use of boards

and cells such as the JTCB and JGAT cell, the JFACC can develop products such as the JIPTL, MAAP, and ATO which synchronize and deconflict missions while ensuring that the JFACC accomplishes its objectives. During any counterland effort, the BCD's expertise in interpreting how to attack land targets is important. The audit trail provided through the ATO production cycle helps all subordinate components understand how the JFACC determined the amount of effort to expend towards each objective.

As a centralized command and control structure, the JFACC exercises considerable influence in determining the amount of aerospace effort each JFC objective and priority receives. An Army scenario which incorporates the use of airpower must reflect this reality; all aerospace efforts originate at the JFC-level based on guidance and objectives. Ultimately, the JFC is the sole approving authority of the JFACC's concept of operations.

Army Doctrine

The Army does not share the same view of effects as the joint community. One reason is that the Army contends that effects are only appropriate at the strategic and operational levels of war and for use by a properly resourced joint staff (FMI 5-0.1 2006, 1-10). If the majority of Army operations occur at the tactical level of war, then using EBO would be improperly applying an operational or strategic-level tool. Thus, EBO would have more applicability to operations whose effects are at the operational or strategic level or war. Army doctrine considers major operations at the operational level of war with battles straddling the dividing line between operational and tactical.

Recent organizational changes under the modularity transformation effort have changed at what levels of war corps and divisions operate. In figure 1-1 of the *Army*

Comprehensive Guide to Modularity, the Army envisions that the UEx will participate in major operations. Since the publication of this guide, corps and divisions replaced the UEx. The use of a corps or division would depend on the operational need of the combatant commander. One instance may require a division to command and control several BCTs while in another instance, the scale of the operation necessitates a corps to command and control several divisions (2004, 1-10, 1-12). In either case, modularity theorists view corps and divisions capable of conducting major operations, thus operating at the operational level of war. If this is true, then corps and division staffs which use effects doctrine and assessment techniques would be appropriate, regardless of available analytical and staff resources. While the staff may lack the resources to use effects as well as a resourced joint staff, leveraging the work of the joint staff would be a way to overcome this deficiency.

Army doctrine writers also argue that EBO does not fundamentally change Army doctrine since the Army's fundamentals of full spectrum operations and mission command include the idea of focusing all efforts toward achieving the operation's endstate (FMI 5-0.1 2006, 1-11). The means by which the Army does this is through the results of executing a task or combinations of tasks for a specific purpose (FMI 5-0.1 2006, 1-11). If the execution of those tasks occurs at the tactical level, then the accumulation of tactical effects which influences operational and strategic COGs is what leads to the desired operational and strategic endstate.

It is important to note the difference in the definitions of effect. The first definition below is the joint definition and the second one is the Army version.

An *effect* is the physical or behavioral state of a system that results from an action, a set of actions, or another effect.

An *effect* is a result, outcome, or consequence of an action. (FMI 5-0.1 2006, 1-10).

The joint definition focuses on the state of a system (PMESII). It is implied that a change from one state to another state would constitute an effect. This narrow definition provides specificity and precision in determining what an effect is and is not. Contrast that with the Army's definition. Essentially every outcome of a tactical action results in generating effects. While equally precise, the Army version takes a much broader view of what effects are.

The difference in definitions is not necessarily significant if joint and Army staffs are at different echelons which do not routinely interact, such as a brigade combat team and the JFACC. However, Army headquarters with greater interaction and dependency on the joint task force staff should note the difference and adapt accordingly. This ensures that Army staffs speak with doctrinal precision with respect to joint doctrine. It also ensures that products and assessments that the joint task force produces are read and understood within the joint context of the definition.

The Army acknowledges this dilemma by cautioning the reader that while EBO is not the doctrinal basis by which staffs plan Army operations, Army headquarters must understand how joint forces use effects during joint operations (FMI 5-0.1 2006, 1-7). Since Army divisions and corps routinely serve as the base for joint task forces or components of a joint task force, this understanding is vital. Without it, Army headquarters would not understand or agree with how joint planners arrive at their

conclusions about the nature of the operation since each (joint and Army) uses a different doctrinal construct as their basis for analysis.

While the Army may disagree with the joint community about the theoretical applicability of EBO, the Army does recognize the importance of unified action in operations involving joint forces and interagency partners. Unified action seeks to establish unity of command and effort within the operational area. This differs from past operations where, “operations were broadly classified as continental, maritime, aerospace or unconventional” (*Army Comprehensive Guide to Modularity* 2004, vii). The joint community terms this complementary and reinforcing relationship joint interdependence. Furthermore, FMI 5-0.1 states that these interdependencies are, “intelligence, surveillance, and reconnaissance (ISR); maneuver; fires; protection; sustainment; and command and control (C2)” (FMI 5-0.1 2006, 1-2). While not inclusive, this list is important as the Army formally acknowledges a dependence on other services and components for certain warfighting functions, even though the Army may possess these capabilities.

Army v. Air Force Effects Generation

Air theorists from Douhet to Warden have long argued that airpower can achieve decisive results by attacking directly against strategic centers of gravity. This is known as strategic attack in Air Force doctrine. The Air Force argues that since strategic attack represents the highest potential payoff, commanders should avoid the temptation to divert resources from it to service the operational- or tactical-level fight (AFDD 2-1.2 2003, 39). This dilemma, determining the amount of effort to expend at the strategic level vice operational or tactical levels, is one of the challenges that face the air strategist and the

JFC. If more weight is given to strategic efforts, then the Army may face more fielded forces once combat commences. If the opposite is done, then the Army may benefit at the expense of strategic effects. The way in which the JFC prioritizes these competing efforts will impact Army operations. By extension, exercise planners should resolve these competing priorities as part of the exercise design process in the same fashion. This resolution should be consistent with joint doctrine and achievement of the desired training objectives.

Exercise Design

In order to create a scenario and exercise the practice of doctrine, exercise planners need a way to logically create a scenario that portrays a credible operational environment. TRADOC created the Exercise Design Guide in order to, “Outline[s] a methodology for designing and executing training exercises.” (*Exercise Design Guide* 2004, iv). This methodology, “Takes the exercise planner (EP) from initial determination of exercise parameters, through condition setting to orders production” (*Exercise Design Guide* 2004, 3-1). The result is a process which provides all of the necessary inputs and outputs to generate an operational environment.

The exercise planner creates an operational environment that must meet certain standards. The OE must allow the unit to achieve desired training objectives and field a challenging OPFOR consistent with the Contemporary Operating Environment (COE) doctrine (*Exercise Design Guide* 2004, iv). Balancing training objectives while fielding a doctrinally correct and challenging OPFOR is difficult; hence the creation of the exercise design guide. This is why the condition setting component of the methodology is important.

Condition setting is vital to the design of a quality scenario. It allows the exercise planner to describe how the operational environment changed from pre-conflict to point in the future when the operation begins. The alteration of the OE occurs due to a variety of factors to include the application of joint effects through airpower. If this application occurs prior to the Army portion of the scenario, then some process should account for how this occurred. Without this knowledge, planners will have difficulty in determining what targets have been struck, how the OPFOR had adapted to previous operations, and how other areas of the OE have been influenced (i.e., political, economic, and social factors). This would force planners to make assumptions about the state of the OE when it should be well-defined to facilitate initial planning.

To arrive at a postulated state of the OE, exercise planners follow a six-step process. This process is depicted in figure 5. The left-hand column describes the logical progression of AO selection to the end result of the Road to War. Accounting for the OE variables is integral to this process. The first four steps are relatively straight forward. The exercise planner determine the terrain, friendly and enemy courses of action and organizes the battlefield by placing the friendly and enemy forces on the battlefield to determine starting conditions (*Exercise Design Guide* 2004, 3-12). To determine a portion of the starting conditions, TRADOC uses a process called forces analysis.

The purpose of forces analysis is to help the EP construct the OPFOR forces structure for each COA within the exercise (*Exercise Design Guide* 2004, 3-13). This requires the input of data and settings of all OE variables as well as computing the force ratio of friendly and enemy forces (*Exercise Design Guide* 2004, 3-13). To assist the EP, TRADOC developed a spreadsheet tool to assist in the input and computation of these

factors. This tool allows the EP to shape the OPFOR to a force ratio that would be consistent with the friendly force's mission. For example, the friendly unit is conducting a deliberate attack against an enemy force who is conducting a deliberate defense. Doctrine says that the force ratio should be at least 3:1 prior to committing the attack. Forces analysis provides the EP with a way to ensure that the OPFOR is at or near this level at the beginning of the exercise.

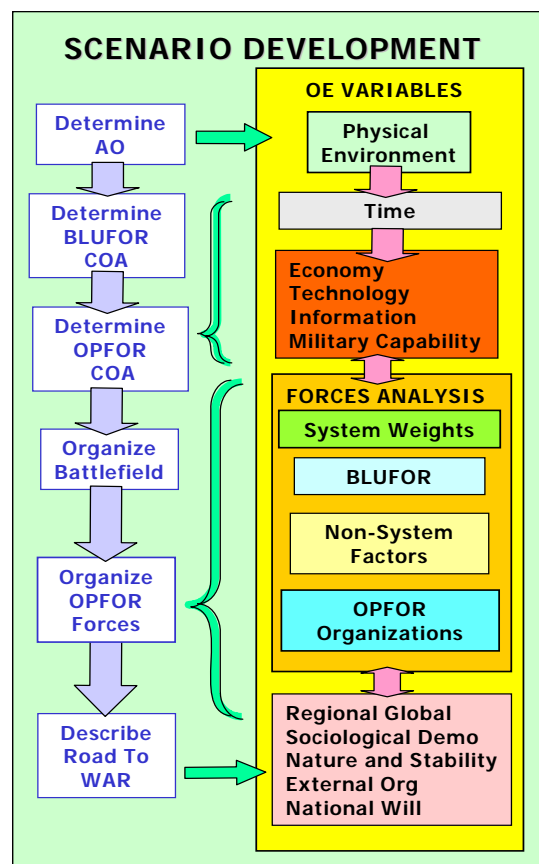


Figure 5. Scenario Development

Source: Department of the Army, *Opposing Force Exercise Design Guide* (Washington, DC: USA, 20 September 2004).

If exercise planners begin with an operational environment and use the forces analysis tool to derive another OE which is suitable for the exercise, some method must exist to record these changes. This is the Road to War. While not a formal document, the Road to War “describes chronologically the incidents and the events leading up to the current situation and BLUFOR/OPFOR disposition” (*Exercise Design Guide* 2004, 3-14).

Additional information that exercise planners should provide include:

- Explain the deployment and disposition of the training unit at STARTEX.
- Identifies C-Day, M-Day, and D-Day.
- Explains OPFOR forces and battlefield
- Organization and dispositions.
- Reflects FM 7-100 doctrine.
- Provides reasoning for execution of training objectives and subtasks. (*Exercise Design Guide* 2004, 3-14)

While the *Exercise Design Guide* explains how to create the Road to War, it offers no means to describe how to chronologically describe the events leading to the current situation.

Another shortcoming in this methodology is that no process exists to determine if it was possible to arrive at the desired OE state from the original state in the time specified in the Road to War. For example, a JFC commander may determine that he will attack with JFLCC forces ten days after the initiation of hostilities. This would give him ten days to shape the OE in support of the JFLCC using the other components.

Furthermore, the JFC would define what conditions should exist before he commits the JFLCC to the attack. Based on his available assets and guidance, would this be possible or feasible? Could the JTF achieve the desired condition set for the JFLCC but at the

expense of other objectives? The TRADOC process offers no solution to resolve these questions.

How would exercise planners resolve the inability of the JFC, based on assets available and other factors, to achieve conditions required for starting the exercise? The JFC could shape with more assets earlier. He may decide to limit progress on other objectives and concentrate his effort on JFLCC objectives. He could decide to carry out the attack as scheduled and commit additional resources in direct support of the JFLCC, cognizant of the additional risk involved. The JFC could do a variety of things. This is the same dilemma an exercise director, role playing the JFC, would face in the planning phases of the exercise.

An additional deficiency to the TRADOC process is lack of a crosswalk from the JFC objectives to the current disposition of the OE. Based on accomplishing shaping tasks, striking targets on the JIPTL, and collecting intelligence based on collection priorities, the JTF staff could produce an operational assessment which would describe the OE in its current state and progress on achieving objectives. While this requirement is not required to start the exercise, its inclusion would offer a way to incorporate teaching points on how a joint force commander's may conduct operations. Furthermore, this joint-centric Road to War may be the only opportunity to discuss the joint fight, particularly if joint participation in the conduct of the exercise is lacking due to resource constraints. Chapter 3 will discuss a methodology to supplement the current TRADOC procedure of starting condition generation which could provide greater realism and credibility to the joint fight, especially with respect to JFACC operations.

CHAPTER 3

RESEARCH METHODOLOGY

Introduction

The application and adherence to joint and JFACC doctrine is crucial in designing an approach the Army could use to establish scenario starting conditions based on the application of airpower. By analyzing key components of these doctrines, it is possible to determine what inputs and outputs are necessary to create starting conditions. By documenting the process, scenario developers can create a Road to War which captures the original operational environment, how the joint operation influenced it, and what the new operational environment looks like at the initiation of the exercise. These starting conditions would adequately describe the operational environment based on the application of joint effects.

Analytical Approach

Based on the survey of joint and JFACC doctrine, there exists sufficient evidence to suggest a six-step doctrinal approach to generating starting conditions. By linking the JIPOE to planning models (JOPP and operational design), scenario planning teams can define the mission and operational environment which will facilitate the application of airpower. Incorporating JFACC doctrinal planning and execution cycles will generate effects which can be assessed as changes in the operational environment. It is these changes in the OE which are the starting conditions desired for an Army scenario which begins at some point after the start of the joint campaign.

Once the exercise director and commander have chosen the operational environment in which the scenario will take place, the exercise design staff can begin analyzing the operational environment using JIPOE and the input variables from the TRADOC Exercise Design Guide. As discussed in chapter 2, JIPOE is the former JIPB process but uses the systems approach to describing the operational environment. Once defined using the systems approach with PMESII as the major components, joint planning can occur. Using the Forces Analysis CD to define the variables of the operational environment could supplement this process.

The second step of this approach involves the use of the JOPP and operational design. These two processes result in an approved plan or course of action that provides the JFACC with the necessary guidance and objectives to facilitate JFACC planning. These provide the components with vital information such as intent, objectives, endstates, lines of operation and other key factors which facilitate further planning. Once the JOPP and operational design processes have been applied to the operational environment, JFACC planning processes can further refine the plan or course of action into a definable set of inputs and outputs which will create the starting conditions.

In order to create meaningful output for starting conditions, three processes must interact. These three processes are the joint targeting cycle, ATO production cycle, and collection management process. These are the means by which the JFACC analyzes the mission, identifies targets based on commander's priorities, apportions and allocates airpower, and influences the operational environment. By continuously applying each of these processes, effects are generated which shape the OE. The creation of these effects

require assessment in order to determine how successful the operation is progression and whether or not adjustments are needed.

The fourth step in this methodology is assessing created effects. This requires a crosswalk of the endstate and mission, objectives, and desired effects to tasks to inform decision making. This is a natural byproduct of combat assessment: the sixth step in the joint targeting cycle. Assessing the generated effects will permit the scenario design team to determine how the operational environment has changed through each iteration of ISR collection and targeting. Thus, each iteration requires the team to assess changes in the operational environment. Figure 6 portrays the assessment of effects at each level of war.

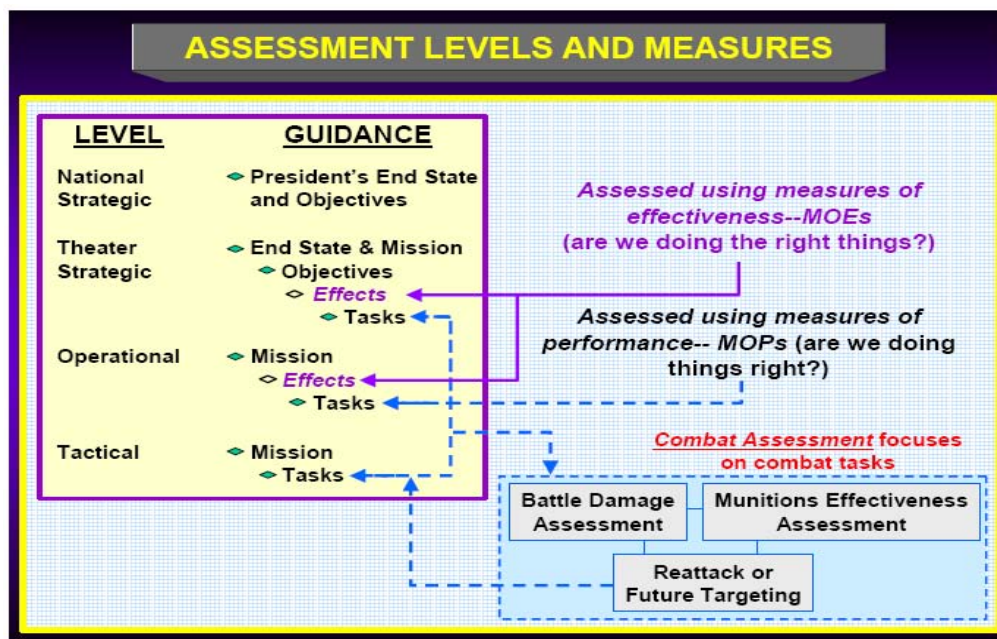


Figure 6. Assessment Levels and Measures

Source: Chairman of the Joint Chiefs of Staff, *Joint Operation Planning* (Washington, DC: CJCS, 11 April 2006).

This assessing of changes in the operational will require both quantitative and qualitative approaches based on the type of effect generated. For example, attrition could be a probabilistic or deterministic effect, but quantitative nonetheless. Assessing socioeconomic changes in the OE may require more qualitative, social and political science oriented approaches. Regardless of the approach, both quantitative and qualitative measures are required to properly conduct effects assessment.

The fifth step in this process is a documentation step to record adjudications and results. These results are applied to the operational environment based on the effect on each PMESII system and their influences on each other based on assumptions made during the JIPOE. This creates a new operational environment each iteration. These new operational environments are reanalyzed using steps three through six until the Army portion of the scenario begins. If a flowchart were to portray this six-step process, it would look like figure 7.

This approach has several strengths and weaknesses. The first advantage is that it supplements an approved TRADOC process by accounting for an interaction between the JFACC and the OE. This approach also incorporates emerging and current joint doctrine by logically progressing from the formulation of objectives by the JFC to the creation of a desired operational endstate. It provides a systematic way to account for JFACC actions and to record them as part of the Road to War, something that is currently lacking in the *Exercise Design Guide*. Finally, this process could expand to include other components as well as interagency efforts.

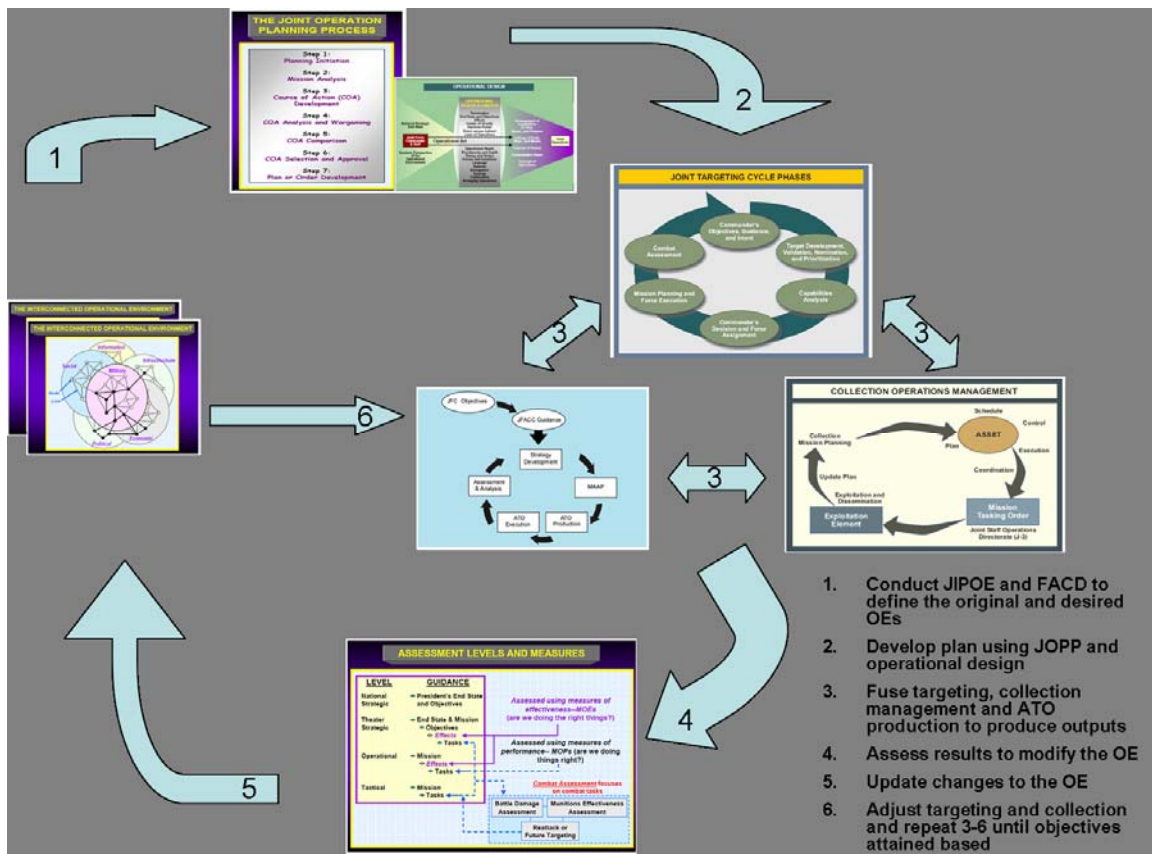


Figure 7. Doctrinal Flowchart to Establish Starting Conditions

This process has several weaknesses. The first is that this process could be resource intensive. The amount of preparation time to craft a systems perspective of the operational environment would require time and subject matter expertise that may not be readily available to most staffs at the corps and division level. While TRADOC exercise proponents could assist in the design of this new view of the OE, this would require additional training by JFCOM. Another weakness to this process is that a thorough knowledge of joint capabilities and data to support additional modeling is necessary. This may change classification levels of the exercise and may not suit wider participation.

The proposed solution will describe a process and define what inputs and outputs are required to support it. It will not create a model to determine attrition and other outputs which would be necessary to fully define the starting conditions. By defining what additional modeling requirements, other researchers and analytical agencies can further add to this body of knowledge.

CHAPTER 4

ANALYSIS

Introduction

In order to create a process which scenario developers could utilize to determine ISR and targeting starting conditions based on the application of airpower, it was necessary to choose a pre-approved scenario as a source of example. The scenario is the JTF Caspian Guard scenario used throughout the academic year at the US Army Command and General Staff College. Specifically, this paper will use the JFLCC portion of the exercise conducted during Phase I of the Advanced Operational Warfighting Course. Throughout this chapter, this paper will use key portions of the scenario to highlight or illuminate my analysis.

In this phase, an Army corps serves as the JFLCC to JTF Caspian. The OPLAN envisions a six-phase operation which conforms to the new phasing construct laid out in new draft of JP 5-0 (JP 5-0 2006, IV-34). As a starting point for analysis, Phase IV (Dominate/Offensive Operations) is the starting point for the Army focus of the training exercise when the JFLCC is the supported commander. This phase, beginning at D+10, is a twenty-day phase to achieve the endstate of expelling all Ahurastan forces from Azerbaijan and US forces posturing into adequate defense positions along the Azerbaijan borders (JTF Caspian Base Order, p. 13). As conditions for entry into this phase, one army division has closed in its forward tactical assembly area and Ahurastan's OSC-East exploitation forces have been attrited by 30 percent. This is the success criteria which favors the successful offensive which will expel Ahurastan's forces from Azerbaijan.

Once hostilities commenced, the JTF Commander conducted shaping operations during Phase III to seize the initiative and establish the phase IV conditions for an offensive. In phase III, the JFACC is the supported commander. This phase begins when Ahurastan attacks into Azerbaijan. During this phase, the JFACC will:

- 1) Achieve air superiority throughout the AOR by defeating Ahurastan ADA and offensive air capability,
- 2) Destroys Ahurastan C² nodes prevent Ahurastan massing of ground maneuver employment in order to shape conditions for decisive maneuver during Phase IV.
- 3) On order, JFACC conducts air operations against maneuver forces and LOCs of the OSC-East and the Reserve Command in Ahurastan. (JTF Caspian Base Order 2005, p. 12).

By accomplishing these three tasks, the JFACC commander will have shaped the OE sufficient for land combat. Thus, the process to build starting conditions based on airpower will have to account for ten days of JFACC operations.

Using the six-step doctrinal process advocated in chapter 3, this paper will demonstrate how scenario planners can use the scenario products and orders developed for a JTF-level operation and create sufficient starting conditions to support the JFLCC portion of an exercise using the JTF Caspian scenario. To do this, several assumptions are required. First, the JFACC will close all forces into the theater of operations prior to Phase III. While the JTF Caspian scenario provides a force deployment timeline, it neglects the movement and deployment of JFACC assets. Second, all JFACC operational data is based on CENTAF's OIF By the Numbers report. This will generate operational data about sortie generation and other useful information which will be necessary to provide some meaningful quantitative analysis for starting condition generation. Third, this analysis will ignore the contributions of the other components, specifically special

operations and maritime operations; this thesis will only focus on airpower contributions from JFACC assets. Finally, all emerging joint doctrine for effects is based on the 2006 RFC draft of JP 5-0. While not officially doctrine, it is assumed that draft statements about the use of effects and the operational environment will not change dramatically with the publication of JP 5-0.

The first step of the six step process involves two major analyses: JIPOE and Forces Analysis. The endstate of conducting JIPOE will be a defined OE based on a systems perspective. This perspective will provide the training staff with the joint approved model of the OE which facilitates component planning. The other portion of this first step, forces analysis, allows the exercise director to, “Calculate appropriate OPFOR force strength to field against any given BLUFOR force and operational environment” (Opposing Force 2004, 6-1). Combining JIPOE and Forces Analysis will field an adversary which can be analyzed using joint doctrine and be of such strength consistent with doctrinal planning factors and norms.

JIPOE

In order to generate information requirements which support ISR and targeting operations, it is necessary to examine four sources of information which should generate input and output information needed for analysis. These sources are the JIPB process outlined in JP 2-01.3, the modification of JIPB for a systems view of the OE in JWC 3-55, the forces analysis model used by TRADOC, and the list of generic intelligence requirements listed in Appendix C of JP 2-01. Analyzing these four lists creates a list of generic information or intelligence requirements that support operational planning. However, each requirement must be categorized using PMESII, terrain, or weather. Thus,

each requirement will be classified as a political information requirement, military, social, etc. using the PMESII construct. This was necessary to provide the expanded view of the operational environment advocated in emerging joint doctrine. Additionally, terrain and weather are added to the list to ensure that the physical environment is taken into account.

In many cases, these information requirements can be categorized into several subsystems. This connectivity to other subsystems within the adversary's system provides the analyst with a richer understanding of the complexity of the operational environment. For example, one information requirement may be to assess the extent, type, and operational implications of attack on a WMD facility. Depending on one's point of view and the specific country in question, this could be categorized into the military or infrastructure subsystem. Taking into account terrain and weather would further enhance the analyst's view of this information requirement. If the JFACC attacked this facility, analysts would consider the effects of such an attack based on the military and infrastructure subsystems. Accounting for terrain and weather would provide sufficient detail to ensure that planners could reasonably predict targeting effects and how each of the generated effects affects other parts of the adversary's system.

Once completed, the generic list is matched against the scenario to place these requirements in the specific OE for the exercise. This ensures that the staff has the system's view of the OE and enough information to properly analyze it. These products can either be intelligence products produced as part of the higher headquarters' order or as Road to War products if they are tied to specific events.

To generate information requirements, it is necessary to examine the JIPB and systems modification in JWC 3-55. This results in the four-step JIPOE process which incorporates JIPB but modifies some of the analysis to account for the systems perspective of the OE. In the first step of JIPOE, the planner must define the operational environment. This first step involves eight further substeps listed below:

(1) Define the Operational Environment

- (a) Analyze the joint force's mission and JFC's intent
- (b) Identify geographic and non-geographic boundaries of the JFC's OA
- (c) Establish the limits for each geographic and non-geographic system within the commander's guidance and intent
- (d) Determine the full, multi-dimensional, geographic and non-geographic systems of the joint force's OA: terrain, weather, military, political, economic, social, etc.
- (e) Determine the relevant OE systems and depict their elements as nodes and links
- (f) Identify the amount of OE detail required and feasible within the time available
- (g) Evaluate existing databases and identify information gaps and priorities
- (h) Collect the information and intelligence required to support further system analysis

(JWC 3-55 2006, II-7).

This resulted in thirty-five outputs listed below:

JOA Boundary	Political-Information Link
AOI	Political-Infrastructure Link
Non-geographic boundaries	Military-Economic Link
Political System	Military-Social Link
	Military-Infrastructure Link
Military System	Military-Information Link
Economic System	Economic-Social Link
Information System	Economic-Infrastructure Link
Infrastructure System	Economic-Information Link
Social System	

	Link
Political Node	Social-Infrastructure Link
Military Node	Social-Information Link
	Infrastructure-
Economic Node	Information Link
Information Node	Information Gap
Infrastructure Node	Information Priority
Social Node	Collected Intelligence
Political-Military Link	Terrain
Political-Economic Link	Weather
Political-Social Link	

Depending on the scenario chosen, some of these outputs may not be required. However, this list constitutes a minimum set of requirements for defining the operational environment with a system's perspective. If information is not available to satisfy a particular requirement (e.g., a social-information link), this creates an information gap that must be resolved through collection management. These gaps feed the collection management process in the third step of this starting condition development process. This set of thirty-five requirements can be analyzed in step two of JIPOE: Describe the Battlespace Effects on Friendly and Adversary Operations.

In step two of JIPOE, Describe the Battlespace Effects on Friendly and Adversary Operations, the set of information requirements from above allow analysis of the effects of operations on friendly and adversary forces. Step two of JIPOE consists of the four substeps listed below:

(2) Describe the Battlespace Effects on Friendly and Adversary Operations

- (a) Analyze the OE
- (b) Evaluate the potential effects on military operations in each system
- (c) Analyze the desired and undesired effects identified by the J3/5 to identify key nodes and links

(d) As part of joint operation planning, describe the JFC's effects on adversary, friendly, unaligned systems: desired and undesired behaviors
(JWC 3-55 2006, II-7)

This generated eight additional outputs which are classified as effects.

- Political Effects
- Military Effects
- Economic Effects
- Information Effects
- Infrastructure Effects
- Social Effects
- Terrain Effects
- Weather Effects

Many of these categories will have several effects identified based on the influencing factor. Military operations in an oil-rich country could have numerous economic effects, each of which is distinct from the others. For an oil-rich country, economic effects may affect regional trading partners and the global economy through higher prices and diminished supply. This could have cascading effects in the social system of that country by creating black marketing for oil or force the political leadership to destroy the oil economy as part of a scorched-earth strategy. These effects cannot help but have strategic and operational impacts which a land component would have to address as part of any operation. By extension, corps and divisions may not face the full list of these effects but certainly a subset of them.

The third substep furthers the planner's understanding of the OE and how the identified nodes and links may contribute to the center of gravity analysis in step three of JIPOE. This takes the previous list of links and nodes and reclassifies those which are

may compose a center of gravity. Thus, the planner can narrow the list of nodes and links to consider in step three of JIPOE where COG analysis occurs.

The final substep in step two examines the list of identified effects and classifies them as desired or undesired effects. This analysis allows the commander to visualize the impact of military operations against the entire adversary system and predict which he wishes to create and those he wishes to avoid. The classification of these effects will be important once the staff begins course of action development.

In the third step of JIPOE, Evaluate the Adversary, planners determine centers of gravity, update OE models, and determine current friendly and adversary situations. The substeps of step three are:

(3) Evaluate the Adversary

- (a) Identify adversary and friendly systems, nodes, and links and potential interrelationships
- (b) Conduct COG analysis in terms of systems, nodes, links and the interrelationships between potential friendly and adversary COGs
- (c) Update or create OE models
- (d) Determine the current adversary and friendly situations
- (e) Identify adversary intentions and critical factors

(JWC 3-55 2006, II-7)

From the previous list of nodes and links, planners evaluate those which compose the center(s) of gravity. Each center of gravity, based on joint doctrine, is to be categorized by critical capabilities, requirements, and vulnerabilities. These three critical factors are either nodes or links under the systems construct of the OE. The identification of the center of gravity will be important in further steps of the starting condition model as an

input to the targeting and collection management processes. Once the COG analysis is complete, the planners update the OE model, friendly and adversary situations.

From this third step, fifteen additional information requirements have been identified. The first two are the friendly and adversary COG with the third being an updated OE model. The COG requirement is flexible such that both strategic and operational COG may be identified as well as multiple or changing centers of gravity.

The last twelve are related to the adversary situation. These are:

- Adversary Tactics
- Adversary Options
- Adversary HVT
- Adversary Timeline
- Adversary Composition
- Adversary Disposition
- Adversary Strength
- Adversary Training Status
- Adversary Logistics
- Adversary Effectiveness
- Adversary Electronic Technical Data
- Adversary Miscellaneous Data

These twelve requirements further define the adversary's current situation into factors which will shape the adversary's potential courses of action.

The fourth step of JIPOE, Determine Adversary Courses of Action, combines all of the relevant analysis from the previous three steps of JIPOE and result in multiple courses of action based on the amount of time planners have to develop them. This final step of JIPOE has six substeps shown below:

(4) Determine Adversary Courses of Action.

- (a) Identify the adversary's likely objectives and desired endstate
- (b) Identify a full set of COAs available to the adversary
- (c) Portray the adversary's perspective of anticipated friendly COAs

- (d) Evaluate and prioritize each adversary COA
 - (e) Develop each COA in the amount of detail time allows
 - (f) Identify initial intelligence collection requirements for adversary, friendly, and unaligned systems
- (JWC 3-55 2006, II-8)

The first substep results in the identification of the adversary's objective(s) and desired endstate. Additionally, the second substep results in courses of action, dependent upon the amount of time planner have to identify them. Furthermore, substep 4e results in the situation template. This product facilitates collection planning by hypothesizing how the adversary doctrinally operates, the terrain and physical environment, and his current situation. The final substep results in three requirements, an event template, event matrix, and named areas of interest (NAI) which support collection planning against the adversary's potential courses of action.

In all, the JIPOE process generates 73 information requirements. These diverse requirements ensure that the scenario planner developments a model of the OE which conforms to the joint standard for a system's perspective of the OE. This list represents the minimum standard, as specified by doctrine, to defining an OE. While some of these requirements may not be necessary based on the chosen scenario, this list provides the minimum to consider for OE planning.

Looking beyond the JIPOE process and incorporating other models into requirements generation, the TRADOC forces analysis process provides another source of potential information and intelligence requirements for the scenario planner. From the forces analysis, this thesis will examine the non-system factors for inclusion into the requirements generation process. These non-system factors provide additional ideas and information that will further define any OE chosen for scenario development. To make

these requirements relevant to the systems perspective, they must be crosswalked to the PMESII construct. This will assist in further defining each subsystem of the OE and help provide an idea of how a subsystem may be linked to others in the OE. Table 3 depicts the crosswalk of nonsystem factors to the PMESII construct.

Table 3. PMESII Crosswalk with TRADOC Nonsystems Factors

	P	M	E	S	I	N	I	F
Individual Characteristics								
Individual training and soldier competence								
Health and Physical Readiness	X	X	X	X	X			
Familiarity with Electronic and Automotive Technology	X		X	X	X		X	
Literacy	X		X	X				
Military Indoctrination and MOS Training		X	X					
Ideological commitment								
Political Indoctrination and Identification with Culture, Values.	X	X		X				
Goals and Values Officers, NCOs, Enlisted Soldiers/Government	X	X		X				
Individual clothing and Equipment		X	X			X		
Collective Characteristics								
Unit Training		X	X		X			
Leadership								
Leader Selection and Characteristics	X	X		X				
Concern for soldier welfare		X		X				
Officer/NCO tactical competence	X	X		X				
Initiative	X	X		X				
Motivation	X	X	X	X	X	X	X	
Unit Cohesion								
Organizational Characteristics		X		X				
Ethnic, Racial, Religious Tensions	X	X		X				
Unit logistics		X	X			X		
Unit Pride		X						
Discipline		X						
Loyalty	X	X		X			X	
Material support								
Maintenance		X	X					
Transport		X	X		X			
Personnel Support	X	X	X	X	X	X	X	
Medical Support		X	X	X	X			

(Note: Categories based on nonsystem factors from TRADOC Forces Analysis 2004; crosswalk based on an analysis of factors and to which subsystem they matched.)

Analyzing these factors will assist planners in creating a detailed OE that contains many of the intangible attributes needed for creating realistic starting conditions. This list will become important once the choice of the adversary in the scenario is made and these factors are applied to his forces.

The final piece to analyzing the OE is to examine the information requirements outlined in Appendix C of JP 2-01. The following statement best describes the usefulness of this list.

This reflects the probable intelligence needs of a combatant commander. The list is representative of the major concerns of a commander at any level, but is not offered as a definitive, exhaustive compilation of every possible concern. A combatant command J-2 or subordinate joint force J-2 preparing PIRs for the commander's approval can use this table to stimulate ideas and to identify information gaps, especially since different Service and/or functional components may require more detailed information than outlined in the intelligence requirements provided below. The mission specific list should be prioritized to ensure that collection decisions can be made rationally and that the intelligence effort remains focused on responding to the most important requirements first. (JP 2-01 2004, C-1).

These requirements are crosswalked with PMESII much like the nonsystem factors from TRADOC. Additionally, terrain and weather were considered to ensure applicability to the physical environment. In all, 218 generic information and intelligence requirements exist based on this joint publication. In certain cases, some requirements, such as the health of the adversary's forces, may be redundant with TRADOC nonsystem factors. Others, such as ideological commitment, may be better defined by the TRADOC requirement as opposed to the joint requirement. Counting the results of the PMESII crosswalk yields the results tabulated in table 4. The bottom row of the table counts how many of the generic joint information requirements fit one of the PMESII, terrain, or weather systems. The numbers corresponding to an intersection of a row and column

represent how many of these generic information requirements fit two categories at the same time.

Table 4. Count of Generic Information Requirements

	P	M	E	S	IN	IF	T	W
P	X	56	35	40	29	41	12	2
M		X	40	40	50	54	20	6
E			X	28	45	29	18	4
S				X	20	29	8	1
IN					X	32	28	11
IF						X	9	1
T							X	16
W								X
	72	152	67	51	80	65	42	18

For example, one of the information requirements is to describe adversary intentions and capabilities to conduct environmental warfare. Analyzing this requirement leads to the conclusion that there is a political and military component to this requirement. It would also be linked to the economic, infrastructure, terrain, and weather systems. This linkage satisfies various outputs needed in the systems perspective of the OE. If this situation, environmental warfare, were a part of the scenario, planners would need to describe the makeup of each of the systems involved in terms of nodes and links. This description, if included in the Road to War or in intelligence products given to the staff prior to STARTEX, affords the opportunity to reasonably predict the effects of operations in conformance with emerging joint doctrine.

Expanding JIPOE, TRADOC nonsystem factors, and generic joint information requirements from JP 2-01 have yielded a doctrinally-based standard for scenario product

planning to support a systems-based analysis. Combining Appendix C, JP 2-01, with table 3 creates a generic list of factors to consider when constructing the operational environment for the scenario according to the systems perspective. From this list, the goal will be to choose which of these requirements are most relevant to the JFACC and use these requirements to build starting conditions for the Army exercise based on the application of airpower.

Forces Analysis

As stated previously, the objective of forces analysis is to determine an adversary's strength suitable to the training exercise. This permits the training unit to conduct operations against the adversary at or near doctrinal norms for force ratios, i.e. attacking a defending enemy with a ratio of 3:1. The forces analysis process results in outputted adversary strength to compare against doctrinal "standards" for mission profiles. Ideally, scenario planners could start with an adversary at full strength, input all of the variables required by the forces analysis process, arrive at a desired force ratio converted to a reduced strength, and account for the attrition through the Road to War using all of the shaping means available to the JFC.

The forces analysis process draws on many inputs to arrive at the single output of a friendly-adversary force ratio. To do this, the planner uses four related spreadsheets to achieve the desired output. These are:

1. BLUFOR Workbook
2. OE Variables Workbook
3. Nonsystems Factors Workbook
4. Organizations (OPFOR) Workbook

5. System Weights and Normalization Workbook (TRADOC Exercise Design Guide, 2004)

Each workbook provides the necessary inputs to allow the scenario planner to arrive at a force ratio between friendly and adversary forces. Figure 8 shows how the five workbooks are related.

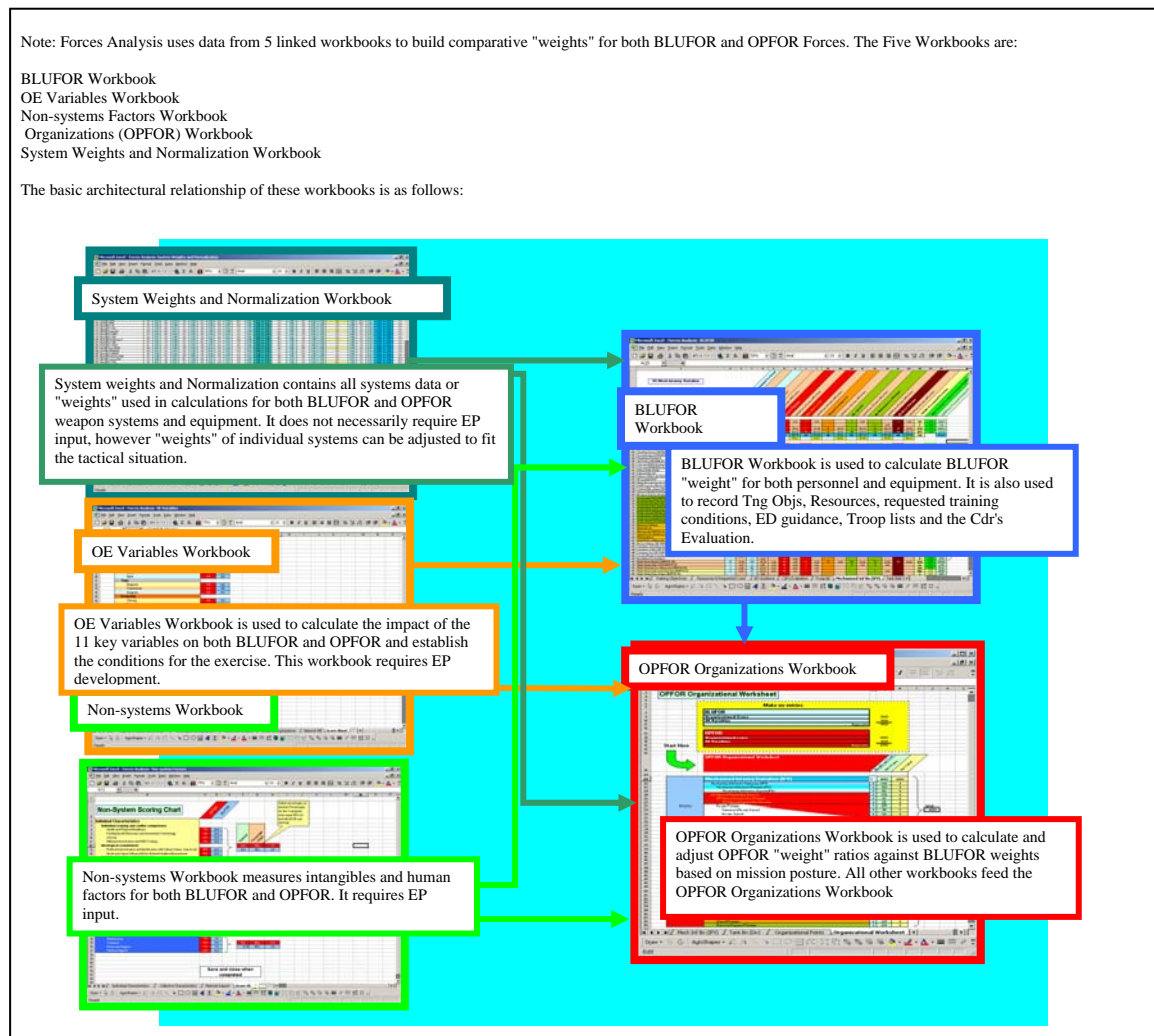


Figure 8. Relationship of Forces Analysis Workbooks

Source: Department of the Army, *Forces Analysis – BLUFOR* (Washington, DC: USA, 11 May 2004)

The next workbook, the OE Variables Workbook, uses inputs based on the 11 variables of the operational environment. This workbook allows the exercise planner to input the characteristics of the adversary as defined by these 11 variables. Many of the factors considered in the JIPOE process are inputs to this workbook. This mapping is vital to modifying the OE to ensure that both military and non-military related factors are considered. This permits the scenario planners to complete the workbook and influence the desired outcome of forces analysis--the force ratio.

The third workbook, Nonsystems Factors, is an area already addressed. Table 3 showed the relationship between these nonsystem factors and the systems perspective of the OE. Again, scenario planners must define each of these factors based on the unique OE. Much like the OE Variables Workbook, these nonsystem factors values help derive the force ratio.

The fourth workbook, BLUFOR (Blue Force or friendly force), requires special attention. This is the first place in the process where training objectives and exercise design intersect. Three vital inputs are required to complete this workbook: training objectives, troop list, and organizational worksheet. Each of these inputs shapes the friendly force's contribution to the force ratio.

The central concern and *raison d'être* of any training exercise is training a unit or staff to achieve training objectives set forth by the commander. According to TRADOC, training objectives serve three purposes: "they establish the tasks to be trained, define the essential conditions under which the senior trainer feels the unit must be able to perform those tasks and finally, they define the standard by which performance will be measured"

(Opposing Force 2004, 2-1). Ultimately, the commander's choice and wording of training objectives constrains and guides the exercise and scenario planner's work.

The first constraint on the scenario planner is the choice of tasks performed by the friendly and adversary force. In the case of the CGSC scenario, the JFLCC's task is to attack against a defending enemy force. The selection of the task drives the scenario planner to a predetermined condition of force ratios based on doctrinal standards. That assumes that the exercise director would want the unit, the land component in this case, to attack based on optimal conditions. Thus, the scenario and Road to War have to reflect the eventuality of an attack against a defending enemy force based on approved conditions set forth by the exercise director.

The second and more important constraint is that of conditions. Based on doctrinal norms, the JFLCC in this scenario should attack with a minimum of a 3:1 advantage if the adversary uses a maneuver defense and upwards of a 5:1 advantage in the case of an area defense (Forces Analysis-Organizations (Maneuver) 2004). If the scenario planner assumes that the JFLCC will attack once this condition is met, then the Road to War must show how the adversary went from his starting strength to the strength required by the conditions of the task. This provides clear linkage to the JTF's plan and demonstrates the components' effects on shaping the OE per the JFC's intent. More importantly, this attrition should become targeting guidance for the scenario planners once they begin to wargame the shaping phase. This would facilitate instructing the staff on the capabilities of airpower and the JFACC's ability to shape the OE in support of the JFLCC. How much or how little shaping is needed will be based in large part on the strength of the adversary force.

The required STARTEX ratio of friendly vs. adversary strengths should conform to the doctrinal standards approved by TRADOC. These are shown in table 5. While the exercise director or commander can approve deviations from these standards, it is assumed for this analysis that the process for generating starting conditions will not deviate from doctrinal standards for force ratios.

Table 5. Mission Profiles for Forces Analysis

OPFOR COA	BLUE COA	
	Defense	MTC
Integrated Attack	3:1	2:1
Dispersed Attack	3:1	2:1
Sophisticated Ambush	3:1 at DP	2:1 at DP
Strike	6:1 at DP	6:1 at DP
Assault	3:1	3:1
Ambush	-	2:1
Raid	2:1	-
Search and Attack	2:1	1:1
Recon Attack	2:1	1:1
	Attack	MTC
Maneuver Defense	1:3	1:4
Area Defense	1:5	1:6
Spoiling Attack	2:1 (1:4 overall)	1:1 (1:6 overall)
Counterattack	3:1 (1:3 overall)	2:1 (1:4 overall)
Simple BP	1:3	1:4
Complex BP	1:5	1:6

DP = Decisive Point
OPFOR:BLUFOR

Source: Department of the Army, *Forces Analysis – Organizations (Maneuver)* (Washington, DC: USA, 11 May 2004)

Scenario planners require four inputs to generate the desired force ratio: OE variables, non-system factors, friendly force strength, and initial opposing force strength. These first two sets of inputs come as outputs from the JIPOE process. The friendly force strength comes from the unit who is participating in the exercise and any associated

enablers added to the task organization. The last set of inputs, initial opposing force strength, is derived from choosing which portion of the opposing force will be fought against in the scenario. Once these four sets of variables are inputted into the forces analysis workbooks, the resulting output of a friendly-adversary force ratio facilitates the crafting of the Road to War by accounting for the shaping that occurred to arrive at the desired adversary STARTEX strength. The key output to this is transforming the attrition into unit strengths of the adversary's forces. This provides scenario planners analytically-derived targeting guidance later in the process. This result concludes the first step of the starting condition generation process. The next step will involve the JTF plan and what necessary products are required to facilitate targeting, collection management, and ATO production in step three.

JFACC Operations

To process the immense amount of data that the JIPOE generates, the JFACC organizes the JAOC into functionally aligned divisions which plan, coordinate, and monitor the execution of aerospace operations in combat. This same construct will allow Army scenario planners to incorporate JFACC operations and doctrine into scenario planning to generate starting conditions. To do this, four divisions of the JAOC require replication by the scenario planning team: Strategy, Combat Plans, Combat Operations, and ISR. By mimicking how these cells operate, Army scenario planners can generate starting conditions that better model the application of airpower.

Strategy Division

The Strategy Division (SD) develops the JAOP for the JFACC. To accomplish this, the SD requires input from the JTF plan as well as guidance from the JFACC. Major inputs needed include the JTF order, rules of engagement, guidance from the JFC and JFACC, priorities, objectives, and the JFC's apportionment decision (AFI13-1AOCV3 2005, 14). With these inputs, the SD can create the JAOP.

While the JAOP articulates the JFACC's plan, other outputs from the SD are required to facilitate execution. Other outputs from the SD should include the Air Operations Directive (AOD), ATO Special Instructions (SPINS) inputs, JFACC's apportionment recommendation for the JFC, and operational assessment summaries (AFI13-1AOCV3 2005, 14). Table 6 shows these inputs and outputs. These outputs provide the foundation for generating airpower in support of the operation and creating starting conditions for the exercise.

Table 6. Inputs and Outputs from the Strategy Division

Strategy Division	
Inputs	Outputs
JTF Order	JAOP
Rule of Engagement	AOD
JFC Guidance	ATO SPINS Input
JFACC Guidance	Apportionment Recommendation
Priorities	Operational Assessment Summaries
Objectives	
Apportionment	

If Army staffs are to understand why the JFACC conducts operations in a certain fashion, these outputs are necessary to provide as part of the Road to War. The JAOP, in

particular, is vital. The JAOP provides visibility to the JFLCC how the JFACC designs the air operation in support of the JTF. Combined with the apportionment decision, staffs gain understanding of the factors which lead to the execution of JFACC operations. Thus, the scenario planning should produce the JAOP and apportionment decisions as part of the Road to War. This allows Army planners to use these products to shape mission analysis and course of action planning. With the creation of the SD's required outputs, the scenario planning team can move to the combat plans phase which creates execution-level products, such as the ATO and ACO.

Combat Plans

The Combat Plans Division (CPD) of the JAOC applies operational art to develop execution plans for air and space operations (AFI13-1AOCV3 2005, 23). By analyzing the JAOP and other pertinent inputs, the CPD creates the necessary products for the JFACC and recipients of air missions to plan, execute, and assess air and space operations. These pertinent inputs include the: AOD, joint target list (JTL), daily component target nomination lists (TNL), component direct support sorties and common-use allocations (such as Marine aviation for internally directed CAS), air support requests, airspace control measure requests, joint ISR collection requirements, SPINS inputs, and the RSTA Annex (AFI13-1AOCV3 2005, 23). Based on the inputs needed by the CPD to function, it is clear that the joint targeting, collection management, and ATO production cycles all intersect here. In the case of the first two cycles, it is assumed that the JFC has delegated authority for targeting and collection management authority to the JFACC – something commonly done in large-scale operations.

Given these inputs, the CPD must produce a variety of products to facilitate execution of air operations. These products include the JIPTL w/ DMPI, MAAP, ATO w/ SPINS, ACO, ADP, ACP, C2 communications and architecture plans, CAS plan, and ISR synchronization matrix (AFI13-1AOCV3 2005, 23). Table 7 fully lists all of the inputs and outputs required of the CPD.

Table 7. Inputs and Outputs from the Combat Plans Division

Combat Plans Division	
Inputs	Outputs
JAOP	JIPTL
AOD	MAPP
JFACC Guidance	ATO
Joint Target List	SPINS
No Strike List	ACO
Restricted Target List	ADP
Target Nomination List	ACP
Air Support Request	TACOPDAT
Airspace Control Measure Request	C2 Plan
Joint ISR Collection Requirement	CAS Plan
RSTA Annex	ISR Synch Matrix
	OPTASK Link

To properly accomplish these diverse tasks, scenario planners must conduct replicate several boards. The first is the JTCB. This will accomplish the role of joint targeting and ensure production of the JIPTL, no strike list, and restricted target list. It also allows each component to nominate and vet the targeting process. Thus, recording this process allows Army planners to see the development of the target lists and understand how targets were approved, disapproved or restricted.

The second board is the JCMB. The collection management board sorts through the diverse collection requirements and prioritizes which assets are matched against

requirements. From table 7, the JCMB would take joint ISR collection requirements and the RSTA annex to generate the ISR synch matrix. This input would also enter the ATO and ACO. Like the JAOP and apportionment guidance, the ISR synch matrix would be a required product provided to the Army staff during the initial planning sessions.

With the conclusion of ISR planning, the scenario planning team can move to the most complex and important portion of the starting condition generation process. This phase of scenario planning involves the development of the master air attack plan and air task order with special instructions. These documents form the foundation of air operations that the Army most readily recognizes. They also are execution-level products that would allow modeling and simulation teams to create attrition and other effects required to define an initial operational environment for the exercise.

To arrive at an ATO which modelers could use to create starting conditions, five factors need to be considered: sortie generation, target list management, allocation of airpower, ISR, and tasking. By sorting through these five factors, the scenario team can arrive at a daily, analytical solution to the problem of matching airpower to targets.

First, the team must account for sortie generation. This requires a laydown of aircraft availability based on maintenance, crew manning, and assets in theater. Using data from the most recent large-scale air campaign, Operation Iraqi Freedom, would provide a realistic assessment of sortie generation. Table 8 lists mission capable rates by airframe during the period covered in the CENTAF study.

Table 8. Mission Capable Rates of Aircraft during Operation Iraqi Freedom

C4: LOGISTICS

Mission Capable rates, overall, were significantly higher than peacetime rates.

USAF AIRCRAFT	MC RATE	USN/MC AIRCRAFT	MC RATE
• A-10A	85.0	• AH-1W	68.2
• AC-130	91.0	• AV-8B	67.3
• B-1B	79.4	• C-130	86.7
• B-2	85.0	• C-2A	85.4
• B-52	76.7	• C-9	96.7
• C-130 Cargo	88.4	• CH-46E	81.3
• C-130 Other	86.9	• CH-53E	87.9
• C-20	100.0	• E-2C	78.8
• C-21A	96.4	• EA-6B	80.4
• E-3B	80.7	• EP-3	72.3
• E-8C	70.0	• FA-18A	79.6
• EC-130E	87.8	• FA-18C	87.3
• EC-130H	97.8	• FA-18C	87.3
• F-117	89.3	• FA-18E	89.7
• F-15C	82.6	• FA-18F	91.0
• F-15E	84.1	• F-14A	89.2
• F-16C+	73.9	• F-14A/T	98.0
• F-16CG	84.0	• F-14D	78.8
• F-16CJ	80.4	• HH-46D	92.5
• HH-60G	88.5	• HH-60H	92.1
• KC-10	81.7	• HH-65	96.7
• KC-135	86.4	• MH-53E	83.1
• MH-53M	82.0	• MH-60S	91.3
• MQ-1	77.2	• P-3	82.0
• RC-135V/W	80.8	• S-3B	89.4
• RQ-1	76.6	• SH-60B	82.4
• RQ-4	74.1	• SH-60F	84.1
• U-2	79.1	• UH-1N	89.4
• UH-60A	100.0	• UH-3	79.2

Source: Central Air Forces, *OIF By the Numbers* (Saudi Arabia: CENTAF, 20 April 2003).

Once sorties are generated, it will be necessary to convert sorties to DMPI-sortie equivalents (DSE) to account for strike packages and weapons payloads. For example, a B-52 carrying JDAMs can strike many more targets than an F-16 in an interdiction role or an A-10 in a CAS role. According to the CENTAF study, “Each aircraft was given a DSE multiplier according to its mission type and weapons capability (e.g., F-16 is 1 DSE, A-10 is 2 DSE, and B-52 (CAS) is 4 DSE) (OIF By the Numbers 2003, 5). Examining A-10 availability in the scenario will yield a conversion of A-10 airframes to DMPIs by the formula:

$$\text{Total DMPIs} = \text{Total A/C} * \text{Sorties/Day} * \text{Mission Capable Rate} * \text{DSE}$$

For A-10s, JTF-Caspian has 51 available in theater (EOCCESartex2012.ppt, 2005).

Assuming 3 sorties per day, a MC rate of 85 percent, and a DSE of 2, the Total DMPIs = $(51)(3)(.85)(2) = 260.1$ or 260. Thus, scenario planners could count on A-10s to strike a maximum of 86 DMPIs using these assumptions. This provides a common standard unit of measure to calculate the strike capability of each airframe.

Once the scenario team has determined how many DMPIs they can strike, they need to allocate assets based on the JFC's apportionment decision. They should account for theater and national assets that are available. This converts percentages of effort to DMPIs per mission area. For example, the apportionment decision for a given day may specify that 50 percent of the air effort is to air interdiction. The scenario planners will take that percentage, match it against the sortie generation possible for that day, and calculate the DMPIs generated to support air interdiction strikes. From the previous A-10 example, allocating 50 percent of A-10 sorties to interdiction would result in 130 DMPIs available for interdiction targets for that day. Thus, the scenario team will have to create a table that tabulates DMPIs to apportioned mission areas.

Once the team has a calculated result of DMPIs to mission area, they must decide which targets to strike from the JIPTL for that day. To do this, they must choose targets that conform to the JFC's targeting priorities. They must also incorporate the operational assessments generated by the strategy division. This ensures that the JFC's priorities are struck without needless redundancy as well as re-striking high priority target sets that

have not been attrited to the desired objective level. This also reinforces the role of campaign assessment--an emerging tool used by staffs in Iraq and Afghanistan.

The final execution products that are required are the ATO and SPINS. The ATO matches targets to the number of assets required to strike the target. Depending on the length of the shaping phase, the Army staff may not need to see every day's ATO. For example, in a ten day shaping effort, the Army staff may only need to see the ATOs that are approved or in development. This may mean that they get the last three or four days' worth of ATOs. This provides the staff with the ATOs which directly affect the start of the exercise without the needless burden of sifting through the early ATOs. If the MAAPs are briefed to reflect the time of the shaping effort, this would suffice.

Combat Operations

The Combat Operations Division is responsible for monitoring and adjusting execution of the current ATO (AFI13-1AOCV3 2005, 38). In the context of this thesis, it is not necessary to replicate the monitoring of the current ATO. This is permissible because the end product should be a model which can reasonable adjudicate the results of targeting and intelligence collection. This model would generate the needed output to assess changes in the operational environment.

Based on an analysis of input factors which may affect the amount of attrition, the TRADOC Analysis Center has put together a straightforward spreadsheet model which would grossly, but reasonably, simulate the effects of airpower. To use this model, it will be necessary to describe the various inputs and how they relate. In all, TRAC considered 7 broad categories of inputs: Disposition, OB, Importance, Detection, Effectiveness,

Execution, and Recuperation. Some of these factors are further defined for a greater degree of specificity.

The first category, disposition, accounts for the target's location and the type of terrain in which it is situated. TRAC considered three target locations: in the operational area, just outside the operational area, and too far outside the operational area. Simply, the target is located in the combat zone, close enough to the combat zone to influence operations, and too far away from the combat zone to influence operations. Based on these categories, the scenario planner would divide the number of targets into these three categories.

Next, the scenario planner accounts for the type of terrain in which the targets are situated. TRAC defines these as exposed, partially hidden, and completely hidden. The scenario planner would analyze the terrain where the target was located and determine how many of each fit these categories. The planner needs to combine this information with the OB. For example, a battalion of tanks (3 companies of 10) could be defending a small village. Based on IPB, the planner determines that one company is defending in the open, one company is dispersed at the edge of the village, and one is hidden in camouflaged positions within the village. Based on TRAC's definitions, 10 tanks would be exposed, 10 partially hidden, and 10 completely hidden. If this battalion was located in the combat zone, then the resulting table may look like table 9. By combining the OB with the unit's disposition, the scenario planner can proceed to importance.

Table 9. Example Disposition of Enemy Tank Battalion

Maneuver				
	Tanks			30
		In operational area		30
			Exposed	10
			Partially hidden	10
			Completely hidden	10
		Just outside operational area		0
			Exposed	0
			Partially hidden	0
			Completely hidden	0
		Too far outside operational area		0
			Exposed	0
			Partially hidden	0
			Completely hidden	0

The importance category is based on the qualitative assessment of how important the target is based on the JFC's priority. TRAC defined these priorities as high, medium, and low. This assessment must come from the collection planning addressed earlier in the combat plans process where the combat plans division. Here, the scenario planner would assess the importance of the target based on JFC guidance, objectives, and intent. Referring to the JFACC tasks outlined earlier on page 61 and using the tank example, this could provide an idea of how to assess the importance of the target. In the early stages of the phase, the JFACC is primarily concerned with establishing air superiority in the JOA. Thus, one would expect air defense assets to have a higher importance to the JFC than tanks. However, as air superiority is established, tanks may rise in importance to the JFC as priorities shift. Looking over time, the JFC may determine that tanks would be a low priority during the air superiority effort and high during the interdiction effort. This permits focusing ISR assets on higher priority targets and assigned greater values of importance.

To get some meaningful output of how many targets are detected, given their importance and disposition, the scenario planner should consider two additional factors: the percent detected and percent identified. TRAC defined percent detected as taking into account the cover/concealment factor as well as the Blue ISR assets and collection plan. Thus, disposition and importance play key roles in determine how much of a target is detected. The second factor, percent identified, is merely the probability of a target being identified as a target, given that it is detected (a conditional probability). Thus, the sensor may determine that something at a location exists, but requires further resolution before it is identified as a target. For example, a Predator may detect a vehicle with its IR sensor at a given location. This probability would satisfy the percent detected value. Based on the sensor, target, and other technical factors, it would take further effort to resolve the vehicle as a tank. This may be due to altitude, visibility, terrain, camouflage, deception, or any host of factors. While the perfect model would be able to account for all of these factors, it is beyond the scope of this thesis to examine them. It is sufficient to estimate and assign sample probabilities to demonstrate the process.

To convert the OB into a value of targets identified, multiply the number of targets by the probabilities of detection and identification or:

$$\text{number identified} = \text{Starting number} * P_{\text{Detection}} * P_{\text{Identification}}$$

Expanding the spreadsheet model yields table 10. From the tank example, it is clear that assigning some sample probabilities, regardless of the value, to detection and

identification lessens the amount of targetable systems. This accounts for the real problems of target detection and resolution that is present during combat.

Table 10. Determining Number of Targetable Systems

Maneuver	AO	Cover/Concealment Factor	Starting #	JTF Intel Priority	% Detected	% Identified	# Targetable
	Tanks		30	1			
	In operational area		30	1			
		Exposed	10	1	0.9	0.8	7.2
		Partially hidden	10	1	0.7	0.8	5.6
		Completely hidden	10	1	0.1	0.8	0.8
	Just outside operational area		0	2	0.6	0.8	
		Exposed	0				
		Partially hidden	0				
		Completely hidden	0				
	Too far outside operational area		0	3	0.15	0.8	
		Exposed	0				
		Partially hidden	0				
		Completely hidden	0				

The next step will be to determine targeting effectiveness. To do this, TRAC examined two factors: attack effectiveness and learning factor. The attack effectiveness, expressed as a probability, determined the probability of destroying the target based on the weapon, tactic, delivery system, and other considerations. Again, this could get extremely complicated and technical and exceed the scope of this analysis. It is enough to assign a probability of destruction to the mission. An innovative factor that TRAC determined as relevant to this type of analysis is a learning factor. This accounts for an initial training level of the adversary as well as allowing the adversary to adapt to friendly tactics over time. Expressed as a probability, a low value reflects a highly trained enemy. A poorly trained enemy, given he survives the initial attack, could receive a better value in later iterations of this model if he can adapt to friendly use of air. Thus, this factor could account for a highly trained adversary like Serbia during Operation Allied Force or a poorly trained adversary like the Iraqis in Operation Desert Storm.

Targeting effective, combined with execution, yields the initial desired output, number destroyed. The execution factors account for the planning done in the MAAP and ATO. The interdiction DMPIs available for a given day for A-10s was 130. To determine how many tanks were destroyed that day due to A-10 interdiction, it is necessary to allocate the 130 DMPIs against all target sets based on guidance. For this example, assume that 10 percent of interdiction DMPIs that day are planned to attack the tank battalion. This results in 13 DMPIs. Taking this result and multiplying it times the attack effectiveness and learning factors yields a value that TRAC defined as Potential Number Destroyed. Assuming a poorly trained enemy force (0.9 out of 1) and a highly effective mission (0.8), calculates the number of potentially destroyed targets. In this case, the value is: $13(0.9)(0.8)$ or 9.36. It is obvious that a lower value for the learning factor would reduce the amount of potentially destroyed targets.

This must be compared to the amount of targetable targets in the AO. In the example, there were 7 potential tanks against 9.36 DMPIs available for targeting. Thus, more DMPIs exist than targets. The desired value is the lesser of these two values. The first case, more targets existing than means to strike them, accounts for limited means. The other alternative, less targets existing than means to strike them, limits the number of possible targets that are possible to attack. Based on this reasoning, the number of tanks destroyed in the example would be 7. This is the lesser value than the alternative which would be the number targetable multiplied by the attack effectiveness and learning factors or $7.2(0.9)(0.8) = 5.184$. Thus, this process has yielded a value for the amount of destroyed targets.

Before this result is valid, one final factor, recuperation, must be taken into account. This allows the adversary to repair battle damage. Based on the sophistication of the adversary's maintenance systems, he may be able to repair a little or a lot of his battle damage. Factoring in the amount of damage and multiplying it by this repair probability yields the amount of systems that are returned to the fight. Assuming a 5 percent repair probability due to the lack of repair parts and low technical skill of the mechanics results in a result of $2.88 * (0.05)$ or 0.144. Thus, the adversary could repair 0.144 tanks. Thus, the remaining tanks for the day in the example would be the sum of the initial number of tanks plus the number repaired minus the number destroyed. This would be $10 - 7 + 0.144 = 3.144$ tanks remaining.

Based on this methodology, a scenario planner could analyze any type of target. The planner could analyze infrastructure, military targets, and strategic targets (leadership, WMD). The key will be to determine the various probability factors that would lead to a computation of an effect.

Intelligence and Combat Assessment

The final piece to this analysis is to interpret the attrition results shown above. This is the role of the ISR division of the JAOC. They are responsible for predictive battlespace awareness (PBA) which is a multidimensional understanding of the battlespace in time, space, and effect, regardless of the adversary, location, weather, or time of day (AFI13-1AOCV3 2005, 66). To provide this interpretation of the operation, this step requires results. Using the results of the attrition process provides the entry point into combat assessment.

The first step in generating meaningful analysis of the operation is to generate a summary. Based on the tank example, it would be reported that two to three tanks were destroyed by A-10 interdiction on D+4. This would be the compilation of pilot reports and other BDA collection. The scenario planner would update the order of battle for that unit, say 1st company of the 1st tank battalion. This would be reported as the company, now at 70 to 80 percent strength, and the battalion at 90 to 93 percent strength.

The next step, assessing the effect of these attacks, gets more judgmental and subject to debate. Based on the operational environment, assume that the presence of this tank battalion in this village was necessary for the defense of an important C2 node, as well as providing law and order for that village. Losing tanks over time would reduce the effectiveness of the C2 node's defense as well as affecting the law and order mission. While the planners may not know with certainty how much attrition would be required for these missions to fail, it is at least possible to provide some predictive analysis of the attrition's effect. These effects, related to the systems view of the OE, provide the scenario planner with a means of predicting the 2nd and 3rd order effects of that particular operation.

If a portion of the friendly force was to occupy this village as part of the Army portion of the scenario, they would know several facts which would have bearing on the mission analysis. First, the adversary tank unit suffered 7-10 percent attrition based on A-10 interdiction on D+4. Second, the tank unit was defending a C2 node and providing law and order to this village. Based on this attrition, one could assume that the JFACC created some collateral damage and degraded the adversary's ability to defend and provide stability. Now, the Army unit in the exercise has a greater degree of information

available with which to plan that may not have been available by using other methods of starting condition generation. While tedious, this meticulous recordkeeping can provide to an exercise a greater degree of knowledge of pre-exercise operations, as well as illuminating joint planning and capabilities.

Once the scenario planner has assessed the effects of the operation, he or she must update the existing operational environment model to reflect these changes. The planner would assess the progress of the campaign and compare this to the success required by the JFC. This process would repeat by continuing to iterate the operation on a daily basis until the JTF achieved the criteria required by the JFC or the day for Army operations arrived and the exercise is ready to begin. Thus, a planner could account for a successful shaping effort in which the JTF met the conditions specified by the JFC or the JTF only partially met the conditions necessary for the JFLCC's portion of the operation and now the JFLCC must adapt to these changes.

Integrating the Training Unit

If the goal of replicating the joint environment in training exercises is to prepare staffs and commanders for those challenges, then the exercise director should involve the training unit in the building of the starting conditions. This reinforces the role that the land component has in providing input to the targeting and collection management processes. Even though the land component typically has a supporting role to the air component during the initial phases of the campaign, it does collaborate with the JTF staff during that time period.

This collaboration must take place during the scenario build when the white cell is putting together the plan and products with which the unit will train. By allowing the unit

to provide targeting and intelligence collection input, the white cell can use their input to shape the starting conditions. Particularly, this input should include what targets to strike or not strike, what the ground maneuver plan will be, and where the ground commander wants to focus air effort for follow-on maneuver once the exercise starts. Experience from Desert Storm to recent events in OIF have demonstrated that interdiction combined with ground maneuver is the best combination to destroy the adversary's conventional warfighting capability. This could reward or punish the unit for their initial decisions and more accurately replicates how joint forces conduct combat operations.

To accomplish this, the white cell must provide planning products to the unit much earlier in the scenario planning process. These products must provide enough information to facilitate planning. In addition to the higher headquarters order, scenario planners must provide some joint task force or air component products. At a minimum, this should include: apportionment and allocation decisions, the JAOP, operational assessment summaries with MOEs and MOPs, JIPTL, no-strike lists, restricted target lists, ISR and RSTA annexes, MAAP, ATO w/ SPINS, C2 plan, and ACO. By provide these JTF and JFACC products, Army planners get involved earlier in the scenario planning process and see the joint task force operation from the air component's perspective.

This earlier involvement of the training unit also allows the exercise director to plan the transition from the air component as the supported force to the land component. This transition, particularly for command and control, is difficult and requires detailed planning. It also allows the white cell to smoothly transition the targeting efforts from

JFACC-nominated targets to JFLCC-nominated targets. Planning this transition, while relatively transparent to tactical forces, is vital to the success of the joint force mission.

CHAPTER 5

CONCLUSION

Army scenario planners must change how they create starting conditions based on changes in joint and other service doctrine. The challenge Army planners will face is that the doctrine is emerging and ever changing, making it more difficult to change in concert with the joint community. Additionally, there are philosophical differences among the Army, Air Force, and joint community as to the direction of future doctrine and concepts. This may prove problematic since joint doctrine, according to regulation, is supposed to outweigh service doctrine. It should come to no surprise that this is somewhat ignored by each service. Joint doctrine, in some minds, is still an amalgamation of service doctrines rather than an authoritative, stand-alone doctrine. How then can Army scenario planners best proceed?

Before answering that question, it is important to know where the joint doctrine lacks enough detail to assist the services. While doctrine authors have created constructs, such as PMESII, to help services understand the operational environment, the construct is ill-defined. The emerging doctrine does not define what constitutes a political system, much less any of the other systems. While it is assumed that the military system is understood, the failure to define these other systems leaves the practitioners without a precise definition which promotes a common understanding--a necessary qualification for any doctrine.

As stated earlier in chapter 2, the Army acknowledges, but does not agree, to the joint vision of the operational environment with respect to effects or the systems

perspective. This flies in the face of two realities. First, the Chief of Staff of the Army repeatedly addresses the concept of the pentathlete--or the idea of soldier-statesmen-diplomats who possess multiple skills other than tactical and technical expertise in military skills. While corps and divisions may not have the resources for a deeper understanding of non-military affairs, it would be prudent to at least expect and demand self-study and professional development in these areas.

The simple reason for this lies in the reality that each area of operation, whether a company or a corps, has aspects of each system in it. Company commanders on the ground in Iraq and Afghanistan deal with a host of issues which do not directly relate to military problems, yet are asked daily to solve. Army exercises must reflect this or it will fail to teach future officers and leaders who do not have the experience of Iraq and Afghanistan how complex the operational environment is.

Another issue with which Army staffs will contend is the capabilities of the Army and the Air Force and which ones each service is best suited to perform. No one realistically expects that the Air Force will hold terrain nor win battles themselves, despite hyperbolic statements to the contrary. Likewise, no one believes that the Army will succeed in combat without the support of the Air Force. However, each service poaches on the other's turf. Some redundancy between the services is healthy and prudent since combat is unpredictable. However, if they are to fight as a joint force, then they must trust each other that when the JFC, regardless of his service origin, expects a component to accomplish a certain task, then the components must trust each other that it will be done in conformance to the JFC's intent. This is crucial when the force structure in theater is limited and the JFC does not have the benefit of overwhelming force.

Exercises which properly employ joint and service doctrines with accurate portrayals of each service's capabilities can help engender this trust. Failure to do this risks the credibility of Army exercises and wargames. While the services compete for shares of the defense budget, it should not come at the expense of a thorough understanding of each other's capabilities.

Like it or not, the air component will impact all facets of the operation. The Army must accept this reality. Dropping a bomb in a Sunni neighborhood will have 2nd and 3rd order effects which soldiers will have to mitigate. Integrating this analysis into Army exercises allows staffs to better understand this causal relationship. If that is to happen, then the Army must learn how air operations are planned, executed, and assessed. This will be time consuming, perhaps more so than the commander is willing to accept. However, the payoff should result in more predictive analysis and a deeper appreciation of the joint force's ability to influence the OE. It should also press the importance of early collaboration and Army input during the targeting process.

This collaboration could prevent the creation of unintended consequences. While kinetic operations will create effects that no one, despite all the information and intelligence available, could reasonably predict, it may reduce the incidence of targeting where one component's operation would clearly suffer ill consequences. Improving exercises and how they are designed may not be a panacea for this problem. But, there is room for improvement, particularly in the area of knowledge management. Still in its infancy, the Army has recognized the need to manage information. It may be some time before joint staffs have the ability to manage the vast amount of information the systems view of the OE creates is mature enough for staffs and commanders to effectively use it.

The collaboration during the scenario planning process helps fix this problem. It allows the training unit to shape its own success and better trains Army staffs on the joint planning process. Since targeting and collection management are highly centralized processes controlled by the joint task force commander, Army staffs must learn how to provide their input. Additionally, the white cell must provide feedback to the unit on targeting and collection management. They can accomplish this during the Road to War brief. By portraying the air component operation as part of the Road to War while highlighting ground component targeting and collection inputs, Army staffs can become more familiar with how these processes work.

One characteristic of scenario design merits special attention. In the example of the tank battalion, air caused some attrition and would have forced the enemy commander into some sort of reaction--for sake of argument assume the enemy disperses his tanks throughout the city to prevent the JFACC from killing them. If that is the case, then the view of the enemy battalion should be consistent between the JFACC and the JFLCC. It makes no sense to cause the enemy to disperse his formation to prevent destruction by air, only then plan on that battalion to fight against land forces immediately as a coherent, organized force with the same capability. That starting condition would be flawed and rightly questioned by exercise participants. There are better ways to create the operational environment desirable to the attainment of the training objectives without sacrificing the capability and doctrine of a particular service.

Realistic replication of capabilities within a certain classification may impact the conduct of scenario planning. While this document is unclassified, the proposed process could work in at any classification level. The data to support this proposal could come

from a variety of means but could be problematic. Most data, while standardized to a particular model, does vary from model to model. This model is a simple design with the objective of arriving at a “good-enough” solution. The probabilities expressed in the TRAC model are binomial probabilities--success or failure are the only two possible outcomes. Other models are much more sophisticated and use more complex probability distributions.

This underlies a common problem in modeling and simulation--standardization of data. The literature review was not able to find an unclassified set of probability data for Air Force capabilities based on binomial distributions. While this is a specific problem set, scenario planners should have such data available and made known so that this type of analysis can be done. With the assignments of FA57 and 49 officers to the corps and divisions, modeling and simulation combined with operations research systems analysis brings unique, quantitative tools which can aid decision making and improve staff analysis. Certainly, these tools could assist in the war-gaming phase of the MDMP. The process this thesis proposes could assist planners in determining outcomes to specific courses of action. While the process is meant for scenario design, it would not take much to adapt it to wargaming during the military decision-making process.

The creation of starting conditions based on the application of airpower offers commanders and exercise directors the opportunity to further educate their staffs on the JFACC's capabilities. Done credibly, future staff officers can learn to trust and rely upon the JFACC to execute and perform those missions assigned to them and for which they are best suited. However, this requires some imaginative, difficult work on the part of Army scenario planners if this is to work. It is going to require that the Army incorporate

Air Force expertise into each of the Army's scenario planning efforts. While the Air Force does not keep AOC's on a string to support Army exercises, the Army should make the effort between each of the services to better support the other's planning efforts. This will ensure that future Army corps on the battlefield can better integrate the CFACC into combat operations.

APPENDIX A

STARTING CONDITION GENERATION PROCESS

1. Conduct JIPOE

A. Define the Operational Environment

- (1) Analyze the joint force's mission and JFC's intent
- (2) Identify geographic and non-geographic boundaries of the JFC's OA
 - (a) Geographic
 - (b) Non-geographic
 - i. Electromagnetic
 - ii. Information
 - iii. Public Opinion
- (3) Establish the limits for each geographic and non-geographic system within the commander's guidance and intent
 - (a) Area of interest
- (4) Determine the full, multi-dimensional, geographic and non-geographic systems of the joint force's OA.
 - (a) Political
 - (b) Military
 - (c) Economic
 - (d) Social
 - (e) Information
 - (f) Infrastructure
 - (g) Terrain
 - (h) Weather
- (5) Determine the relevant OE systems and depict their elements as nodes and links
 - (a) Political Node
 - (b) Military Node
 - (c) Economic Node
 - (d) Information Node
 - (e) Infrastructure Node
 - (f) Social Node
 - (g) Political-Military Link
 - (h) Political-Economic Link
 - (i) Political-Social Link
 - (j) Political-Information Link
 - (k) Political-Infrastructure Link
 - (l) Military-Economic Link
 - (m) Military-Social Link
 - (n) Military-Infrastructure Link
 - (o) Military-Information Link
 - (p) Economic-Social Link

- (q) Economic-Infrastructure Link
 - (r) Economic-Information Link
 - (s) Social-Infrastructure Link
 - (t) Social-Information Link
 - (u) Infrastructure-Information Link
- (6) Identify the amount of OE detail required and feasible within the time available
- (7) Evaluate existing databases and identify information gaps and priorities
 - (a) Information gap
 - (b) Information priority
- (8) Collect the information and intelligence required to support further system analysis
 - (a) Collected intelligence
- B. Incorporate TRADOC non-system factors to modify OE
 - (1) Individual Characteristics
 - (a) Individual training and soldier competence
 - i. Health and Physical Readiness
 - ii. Familiarity with Electronic and Automotive Technology
 - iii. Literacy
 - iv. Military Indoctrination and MOS Training
 - (b) Ideological commitment
 - i. Political Indoctrination and Identification with Culture and Values.
 - ii. Goals and Values Officers, NCOs, Enlisted Soldiers/Government
 - (c) Individual clothing and Equipment
 - (2) Collective Characteristics
 - (a) Unit Training
 - (b) Leadership
 - i. Leader Selection and Characteristics
 - ii. Concern for soldier welfare
 - iii. Officer/NCO tactical competence
 - iv. Initiative
 - v. Motivation
 - (c) Unit Cohesion
 - i. Organizational Characteristics
 - ii. Ethnic, Racial, Religious Tensions
 - iii. Unit logistics
 - iv. Unit Pride
 - v. Discipline
 - vi. Loyalty
 - (d) Material support
 - i. Maintenance
 - ii. Transport

- iii. Personnel Support
 - iv. Medical Support
- C. Describe the Battlespace Effects on Friendly and Adversary Operations
 - (1) Analyze the OE
 - (a) Maritime Terrain
 - i. Maneuver Space
 - ii. Choke Points
 - iii. Natural Harbors
 - iv. Natural Anchorages
 - v. Manmade Infrastructures
 - vi. Sea Lines of Communication
 - vii. Ocean Surface Characteristics
 - viii. Ocean Subsurface Characteristics
 - ix. Littoral Characteristics
 - (b) Air Dimension
 - i. Target Characteristics and Configuration
 - ii. Airfields and Support Infrastructure
 - iii. Missile Launch Sites
 - iv. Aircraft Carrier CM Operating Areas
 - v. Submarine CM Operating Areas
 - vi. Sea Launched CM Operating Areas
 - vii. Surface Features
 - viii. Service Ceilings
 - ix. Air Avenues of Approach
 - (c) Space Dimension
 - i. Orbital Mechanics
 - ii. Propagation
 - iii. Orbit Density and Debris
 - iv. Solar and Geomagnetic Activity
 - (d) Electromagnetic Dimension
 - i. Military Use of IR Band
 - ii. Military Use of MSI
 - iii. Military Use of HIS
 - iv. Radio Wave Directionality
 - v. Radio Wave Attenuation
 - vi. Skip Zones
 - vii. Skip Distances
 - viii. Interference
 - (e) Cyberspace Dimension
 - i. Computer Hardware
 - ii. Networks
 - iii. Computer Software
 - iv. Data
 - v. Procedures
 - vi. Human Operators

- (f) Human Dimension
 - i. Populace
 - ii. Leadership
 - (g) Other Dimensions
 - i. Time
 - ii. Political Constraints
 - iii. Military Constraints
 - iv. Environmental Hazards
 - v. Health Hazards
 - vi. Infrastructure
 - vii. Industry
 - viii. Agriculture
 - ix. Economics
 - x. Politics
 - xi. History
- (2) Evaluate the potential effects on military operations in each system
 - (a) Political Effects
 - (b) Military Effects
 - (c) Economic Effects
 - (d) Information Effects
 - (e) Infrastructure Effects
 - (f) Social Effects
 - (g) Terrain Effects
 - (i) Weather Effects
- (3) Analyze the desired and undesired effects identified by the J3/5 to identify key nodes and links
 - (a) Reclassify nodes and links in 1A5 of this appendix as key nodes and/or links
- (4) As part of joint operation planning, describe the JFC's effects on adversary, friendly, unaligned systems: desired and undesired behaviors
- D. Evaluate the Adversary
 - (1) Identify adversary and friendly systems, nodes, and links and potential interrelationships
 - (2) Conduct COG analysis in terms of systems, nodes, links and the interrelationships between potential friendly and adversary COGs
 - (a) Friendly COG
 - i. Critical Capability
 - ii. Critical Requirement
 - iii. Critical Vulnerability
 - (b) Adversary COG
 - i. Critical Capability
 - ii. Critical Requirement
 - iii. Critical Vulnerability
 - (3) Update or create OE models
 - (4) Determine the current adversary and friendly situations

- (a) Adversary Tactics
 - (b) Adversary Options
 - (c) Adversary HVT
 - (d) Adversary Timeline
 - (e) Adversary Composition
 - (f) Adversary Disposition
 - (g) Adversary Strength
 - (h) Adversary Training Status
 - (i) Adversary Logistics
 - (j) Adversary Effectiveness
 - (k) Adversary Electronic Technical Data
 - (l) Adversary Miscellaneous Data
 - (5) Identify adversary intentions and critical factors
 - E. Determine Adversary Courses of Action.
 - (1) Identify the adversary's likely objectives and desired endstate
 - (a) Adversary Objectives
 - (b) Adversary Endstate
 - (2) Identify a full set of COAs available to the adversary
 - (a) Adversary COA
 - (b) Adversary Doctrinal Template
 - (3) Portray the adversary's perspective of anticipated friendly COAs
 - (4) Evaluate and prioritize each adversary COA
 - (5) Develop each COA in the amount of detail time allows
 - (a) Adversary Situation Template
 - (6) Identify initial intelligence collection requirements for adversary, friendly, and unaligned systems
 - (a) Adversary Event Template
 - (b) Adversary Event Matrix
 - (c) Named Area of Interest
2. Conduct Forces Analysis
- A. Using defined OE variables from JIPOE, define values based on TRADOC definitions in OE Variable Workbook.
 - (1) Physical Environment
 - (2) Time
 - (3) Economy
 - (4) Technology
 - (5) Information
 - (6) Military Capability
 - (7) Regional Global Relationships
 - (8) Sociological Demographics
 - (9) Nature and Stability of the State
 - (10) External Organizations
 - (11) National Will
 - B. Define values based on Non-System Factors Workbook from 1B.

- C. Conduct BLUFOR Analysis
 - (1) Determine training objectives
 - (2) Identify tactical tasks to perform
 - (3) Identify corresponding conditions to the tactical tasks
 - (4) Input task organization to determine BLUFOR strength
- D. Conduct adversary analysis
 - (1) Identify adversary tactical tasks to perform
 - (2) Identify corresponding conditions to the tactical tasks
 - (3) Input starting adversary task organization
- E. Conduct force ratio analysis
 - (1) Record initial force ratio based on mission profiles of BLUFOR and adversary
 - (2) Determine adversary attrition required to meet doctrinal standard based on mission profile
 - (3) Transform attrition required to unit strengths of adversary units in the scenario
- 3. Analyze JTF Order
 - A. JTF Mission
 - B. JFC Intent
 - C. JTF Concept of Operation
 - D. Tasks to JFACC
 - E. JFC Targeting Guidance
 - F. JTF Objectives
- 4. Targeting, Collection Management, and ATO Production
 - A. Strategy Development
 - (1) Inputs
 - i. JTF Order
 - ii. ROE
 - iii. JFC Guidance
 - iv. JFC Priorities
 - v. Objectives
 - vi. Apportionment Decision**
 - (2) Outputs
 - i. JAOP**
 - ii. Air Operations Directive
 - iii. JFACC COA
 - iv. JFACC Intent
 - v. Allocation Request
 - vi. ATO SPINS Inputs
 - vii. OA Summaries**
 - B. Combat Plans
 - (1) Inputs
 - i. JAOP

- ii. AOD
- iii. JFACC Guidance
- iv. Joint Target List
- v. *No Strike List***
- vi. *Restricted Target List***
- vii. Target Nomination List
- viii. Direct Support Allocations
- ix. Air Support Requests
- x. Airspace Control Measures Requests
- xi. Joint ISR collection requirements
- xii. *RSTA Annex***
- (2) Outputs
- i. *JIPTL w/ DMPI***
- ii. *MAAP***
- iii. *ATO***
- iv. *SPINS***
- v. *ACO***
- vi. *ADP***
- vii. ACP
- viii. TACOPDAT
- ix. *C2 Plan***
- x. *CAS Plan***
- xi. *ISR Synch Matrix***
- xii. OPTASK LINK

C. Combat Operations

- (1) Inputs
- i. JAOP
- ii. AOD
- iii. ATO Folder
- iv. ACP
- v. ADP
- vi. ATO w/ SPINS
- vii. ACO
- viii. TACOPDAT
- ix. OPTASK LINK
- x. RSTA Annex
- (2) Outputs
- i. ATO/ACO changes
- ii. *Assessment data***
- iii. *Consolidated reports to JTF***

D. ISR

- (1) Inputs
- i. TNL
- ii. Guidance and priorities
- iii. JAOP

- iv. AOD
- v. ADP
- vi. ACO
- vii. ATO
- viii. IPB
- ix. PIR
- x. NSL
- xi. RTL
- xii. Sensor/platform availability
- xiii. JTL
- xiv. MIDB
- xv. JIPTL
- xvi. Collection requirements
- xvii. ROE
- (2) Outputs
 - i. ISR Synch Matrix
 - ii. RSTA Annex
 - iii. CPCL
 - iv. Updated IPB
 - v. INTSUM
 - vi. DISUM
 - vii. MISSUM
 - viii. OB
 - ix. TNL
 - x. CA inputs to OA

5. Assessment

6. Modification of OE

Note: Items highlighted in bold represent the minimum JFACC products required in this process

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